SHARP®

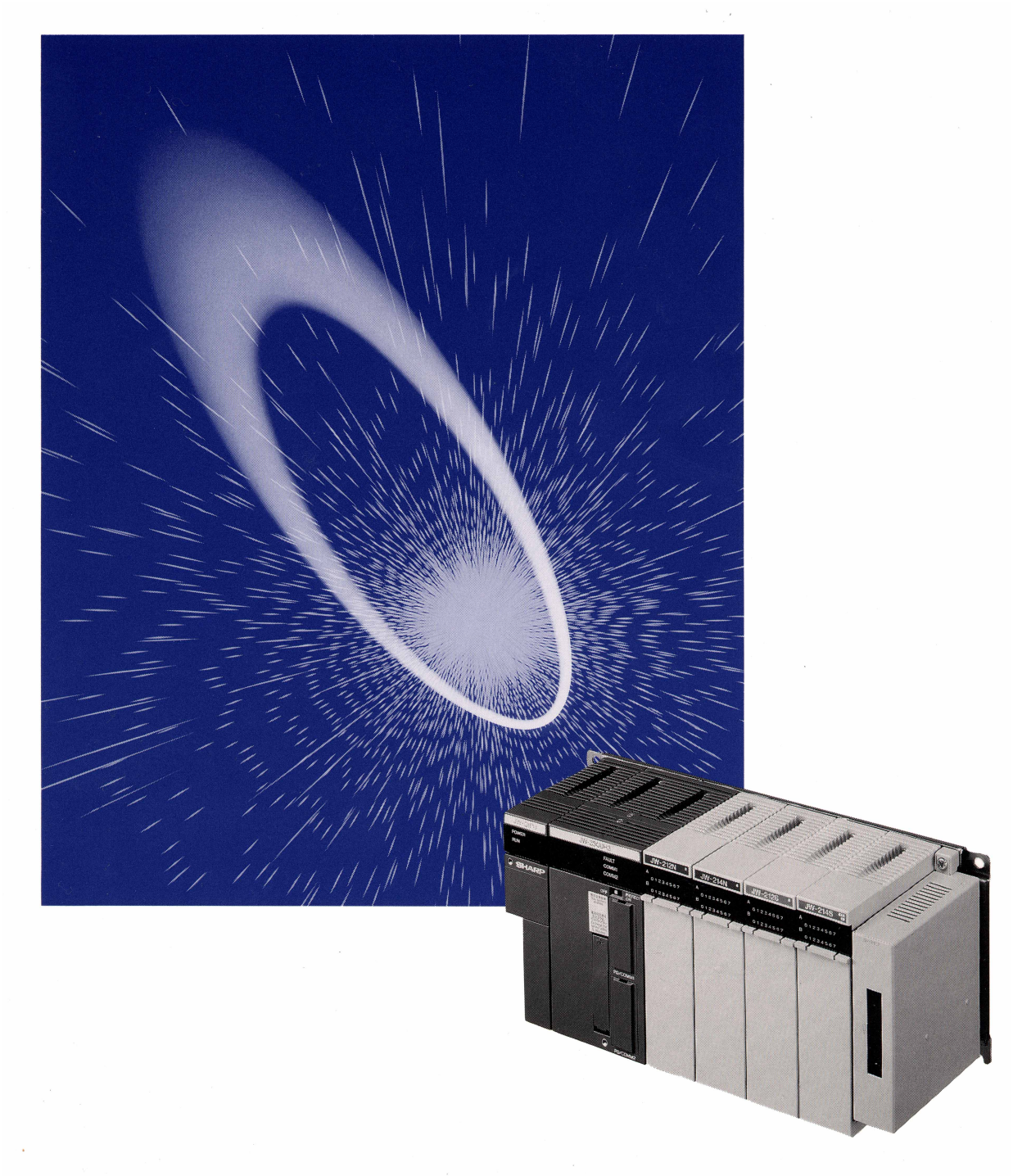
Version 2.3
Produced in Nov. 2000

Sharp Programmable Controller

Model name

New Satellite *JW30H*

User's Manual-Hardware version



We thank you for your purchase of the SHARP programmable controller JW30H.
This booklet (user's manual, hardware version) explains mainly the JW30H's hardware; the system configuration, specifications, installation method etc.
Carefully read this user's manual, hardware version and the JW30H instruction manual attached to the system module of JW30H so that you are able to operate JW30H properly, having thoroughly familiarized yourself with the functions of the system module and their operation method.
Keep this user's manual, hardware version with you together with the JW30H instructions manual.
We are confident that these booklets will be helpful whenever you face problem.
Please refer to the programming manual ladder instruction version.

Note

- This module is made in accordance with Japanese domestic specifications. Its guarantee clauses are described in a separate guarantee card (packed together with the module). When this module is used outside Japan, these guarantee clauses are not applicable. In addition, the guarantee should be understood as a guarantee of the delivered product as a single unit and every other damages or losses due to damage or malfunction of the product will not be included in this guarantee.
- Should you have any questions and inquiries, please feel free to contact our dealers.
- The whole or partial photocopy of this booklet is prohibited.
- Contents of this booklet may be revised for improvement without notice.

Safety precautions

Read this manual and attached documents carefully before installation, operation, maintenance and checking in order to use the machine correctly. Understand all of the machine knowledge, safety information, and cautions before starting to use. In this instruction manual, safety precautions are ranked into "danger" and "caution" as follows.

Danger : Wrong handling may possibly lead to death or heavy injury.

Caution : Wrong handling may possibly lead to medium or light injury.

Even in the case of Caution, a serious result may be experienced depending on the circumstances. Anyway, important points are mentioned. Be sure to observe them strictly.

The picture signs of Prohibit and Compel are explained below.

: It means don'ts. For example, prohibition of disassembly is indicated as ( ).

: It means a must. For example, obligation of grounding is indicated as ( ).

1) Installation

Caution

- Use in the environments specified in the catalog and instruction manual.
  Electric shock, fire or malfunction may be caused when used in the environments of high temperature, high humidity, dusty or corrosive atmosphere, vibration or impact.
- Install according to the manual.
  Wrong installation may cause drop, trouble or malfunction.
- Never admit wire chips or foreign matter
  Or fire, trouble or malfunction may be caused.

2) Wiring

Compel

- Be sure to ground.
  Unless grounded, electric shock or malfunction may be caused.

Caution

- Connect the rated power source.
  Connection of a wrong power source may cause a fire.
- Wiring should be done by qualified electrician.
  Wrong wiring may lead to fire, trouble or electric shock.

3) Use

Danger

- Don’t touch the terminal while the power is being supplied or you may have on electric shock.
- Assemble the emergency stop circuit and interlock circuit outside of the programmable controller. Otherwise breakdown or accident damage of the machine may be caused by the trouble of the programmable controller.

Caution

- "Run" or "stop" during operation should be done with particular care by confirming safety. Misoperation may lead to damage or accident of the machine.
- Turn ON the power source in the specified sequence. Turn ON with wrong sequence may lead to machine breakdown or accident.

4) Maintenance

Danger

- Never connect battery in wrong polarity, or charge, disassemble, heat, throw into fire, or short-circuit. Or it may be broken or ignited.
- Do not subject the battery to impact of any kind. Do not pull on the lead wires of the battery, or liquid leakage accident may occur.

Prohibit

- Don’t disassemble or modify the modules.
  Or fire, breakdown or malfunction may be caused.

Caution

- Turn OFF the power source before detaching or attaching the module.
  Or electric shock, malfunction or breakdown may be caused.
- Replace with the fuses in specified ratings only.
  Or electric shock, malfunction may be caused.

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Chapter 1. Overview

Programmable controller new satellite JW30H has realized the fastest basic instruction processing speed in the world in spite of the medium class, by employing the RISC type CPU, and features the following benefits.

■ Features

1. Fastest processing speed of basic instruction in the world (38 nanoseconds /instruction) is realized.

By employing the RISC type CPU, even a program of 10K-words (basic instruction only) can be operated in about 1 millisecond. As a result, the processing precision is enhanced by the improvement of repeatability, aside from increase of line speed.

2. High-speed data exchange with an option module

To meet the needs for high speed processing speed, the data exchange speed between a control module and an option module is 5 times faster than conventional modules.

3. High-speed serial port: 115.2 K-bits/sec.

Data transfer time to/from a personal computer or a support tool has been reduced dramatically.

4. A large-capacity memory capable of coping with increase of information processing quantity is mounted.

A memory of 63K-words of program memory, 30,000 relay points, and 25K-bytes of register (includes file 1) is prepared, and in addition, a register file of 1984K bytes can be also used. (When using JW-33CUH3)

5. Up to 8 racks and total cable length of 50 m

By using an I/O bus expansion adapter, up to 8 racks can be installed, with a total cable length of 50 meters, so that it enables real-time remote I/O fast operation without time lag. In addition, an I/O bus expansion adapter on the expansion rack panel allows a connection to a programmer, so it enables programming and monitoring on the machine side.

6. Design efficiency of program is notably improved.

Instead of the conventional program which was only a sheet of roll paper, the structural program function for dividing into functions is provided, and block module control (page control) is realized. Also provided is a library function, in which a created program is saved as library and can be reused.

7. Abundant module of JW20H can be used.

Inheriting the compatibility with the previous models, it is possible to cope with modification demands of the existing equipment such as increase of speed and productivity, only by exchanging the control module.

8. The communication port and programmer port can be shared.

Programmer and various module can be connected to the two ports mounted on the control module. A system of high cost performance can be built up, by connecting 2 programmers to debug, or connecting up to 2 module of FA controller terminal or image sensor camera.

(When using JW-32CUH1/33CUH1/33CUH2/33CUH3)

9. Power supply module conforming to UL/CSA.

To meet with overseas demands, the power supply module conforming to UL and CSA is available. It can be used in the system outside Japan, including the English version ladder creation software JW-50SP.

10. Selectable from three numerical value expression methods (octal/ decimal/hexadecimal notations), and application instructions are further fortified.

Data memory, constants of application instructions, program address, and others can be expressed in a notation preferred by the user, and users of other makers can use without any strange feel.

As application instructions, the instructions of conventional models JW20H, JW50H/70H/100H are included, and further comparative instructions with relay outputs, and arithmetic operation instructions with signs are also added.

■ Control module

The table below shows major performance specifications of JW-31CUH1, JW-32CUH1, JW-33CUH1/H2/H3 control modules of the JW30H series.

Item		JW-31CUH1	JW-32CUH1	JW-33CUH1	JW-33CUH2	JW-33CUH3
Max. no. of I/O points		512 points	1024 points	3072 points	3072 points	3072 points
Program capacity		7.5 K-words	15.5 K-words /31.5 K-words*1	31.5 K-words	63 K-words	63 K-words
Data memory	Register *2	9 K-bytes	25 K-bytes	25 K-bytes	25 K-bytes	25 K-bytes
	File memory	None	64 K-bytes /32 K-bytes*1	128 K-bytes	448 K-bytes	1984 K-bytes
Clock feature		None	Yes			
Communication port transfer rate		None	115200/57600/38400/19200/9600/4800/2400/1200 bits/s			
Instruction processing speed		Basic instructions: 0.038 μs Transfer instructions (F-00): 1.22 μs (24 percent in conventional model improved)				
Max. No. of rack		8 racks (In the case of using I/O bus expansion adapter)				
Total length distance for I/O expansion cable		50m max. (Max. 50 m between rack panel and rack panel)				
Data exchange time with option module		The speed becomes approximately 5 times faster than conventional modules when JW-34KB/36KB/38KB basic rack panel is used.				

*1: The JW-32CUH1 can select program capacity and file capacity (file 2) by setting switch SW2 on the module. (Select from 15.5 K-words/64 K-bytes or 31.5 K-words/32 K-bytes.)

*2: The register capacities above include file 1 register (16 K-bytes) that can directly be assigned by application instructions.

=> See the “JW30H Programming Manual.”

Reference

Major specifications of the JW-31CUH/32CUH/33CUH (previous models, discontinued production) control modules for the JW30H series are as follows:

Item		JW-31CUH	JW-32CUH	JW-33CUH
Max. no. of I/O points		512 points	1024 points	2048 points
Program capacity		7.5 K-words	15.5 K-words	31.5 K-words
Data memory	Register*2	9K-bytes	25 K-bytes	25 K-bytes
	File memory	None	64 K-bytes	128 K-bytes
Clock feature		None	Yes	
Communication port transfer rate		None	19200/9600/4800/2400/1200/-600 bits/s	
Instruction processing speed		Basic instructions: 0.05 μs Transfer instructions (F-00): 1.60 μs		
Max. No. of rack		4 racks*3		
Total length distance for I/O expansion cable		14 m max. (Max. 10 m between rack panel and rack panel)*3		
Data exchange time with option module		The speed is still the same as conventional modules even though a basic rack panel JW-34KB/36KB/38KB is used.		

*2: The register capacities above include file 1 register (16 K-bytes) that can directly be assigned by application instructions.

*3: The previous models cannot use the I/O expansion adapter (JW-31EA/32EA).

Chapter 2. Safety precautions

(1) Installation

Avoid keeping the JW30H in the following conditions:

- Direct sunlight.
- Relative humidity which exceeds 35 to 90 %. No condensation due to rapid temperature variation.
- Corrosive and flammable gases.

(2) Operation

- Prepare an emergency stop circuit at the external relay circuit, and connect the halt output from the JW30H. (The halt output is installed in the power supply module.)
- Don't handle switches and connectors excessively by force.

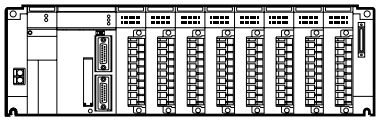
(3) Grounding

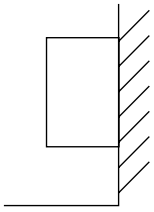
Prepare a class-3 grounding of the JW30H separately. Never co-ground with high power equipment grounding lines.

(4) Installation

- Securely fasten the retaining screws in each module, and confirm again that it is fastened prior to supply power. Looseness of screws may cause malfunction.
- Firmly connect cable (I/O expansion cable), connecting to the basic/expansion rack panel. Confirm connectors are fastened prior to supplying power. Looseness may cause malfunction.
- Each module has a ventilation hole to allow for cooling. Do not block the holes.
- Install the JW30H horizontally against a control panel (parallel, wall-mount installation), otherwise (vertical, wall-mount installation) temperature increase may occur.

○ Good; Parallel, wall-mount installation





(5) Wiring

- Be aware not to cross the connection polarity of 5 VDC on the expansion rack panel. Otherwise, rack panel and I/O module etc. may be damaged.
- Keep the input/output lines away from high voltage or strong current lines such as power lines.

(6) Cautions for static electricity

Significant volume of static electricity may build up on the human body in extremely dry conditions. Prior to touching the JW30H, discharge the static electricity by touching grounded metals.

(7) Cleaning

Use the soft cloths for cleaning. Volatile solvents (alcohol, paint thinner, freon etc.) and wet rags may cause deformation or change of color.

(8) Storage

Keep the JW30H in cool and dry conditions as it equipped with a battery for memory backup. High ambient temperature may shorten its battery life.

Do not put other objects on the JW30H.

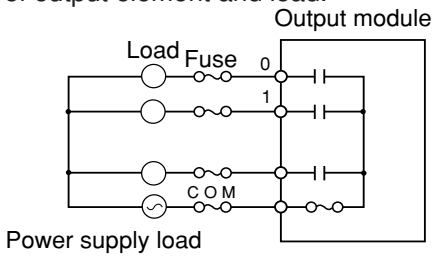
(9) Short circuit protection

If the load connected to the output terminal shorts circuits, the output device or the printed circuit board may burn. Insert a protective fuse in the output lines.

We recommend that you install protective fuses in each line, even if the external devices have fuses for each common unit. These common line fuses are to protect the device against burnout caused by overload, and do not protect against overcurrent of output element and load.

[Precautions when using a rated voltage power source]

When you use a power supply for loads that have a current limiting circuit, provide fuses that match the load rating of each output module. If the load is shorted, and the current limiting circuit functions, the short-circuit current will flow at current level lower than needed to blow the fuse.



(10) Insulation transformer

Choose isolation transformer with a capacity 20% or more higher than the rated load. When a transformer of the same capacity as that of the rated load is used, the primary input voltage might exceed the rated transformer capacity.

In the case of the JW30H, use an isolation transformer with a capacity greater than 72VA.

Power supply module	Power consumption*	Transformer capacity
JW-21PU	60 VA or less	72 VA or more
JW-22PU		
JW-31PU		
JW-33PU	70 VA or less	85 VA or more

* Maximum load capacity when one power supply module is used.

(11) Max. No. of I/O points

Each control module has a maximum number of input and output points, but the number of relay points affecting the maximum number of input and output points varies with the type of the module. It must be noted that it is different from the number of relay assignments. (In the case of JW20H, it is same as the number of relay assignments.)

Kinds of module	Allocation No. of points	The number of relay points affecting the maximum number of I/O points	
		JW30H	JW20H
8 points input/output	16	16	16
16 points input/output	16	16	16
32 points input/output / I/O	32	32	32
Special I/O (64 points input/output)	16	64	16
Special I/O (except for 64 points input/output)	16	0	16
I/O link	16	0	16
Option	16	0	16
Vacant slot	16	0	16

Control module	Max No. of I/O points	In case of all 16 points module	In case of all 32 points module	In case of all 64 points module
JW-31CUH1	512 points	16 points × 32 sets = 512 points	32 points × 16 sets = 512 points	64 points × 8 sets = 512 points
JW-32CUH1	1024 points	16 points × 64 sets = 1024 points	32 points × 32 sets = 1024 points	64 points × 16 sets = 1024 points
JW-33CUH1	3072 points Note	16 points × 64 sets = 1024 points	32 points × 64 sets = 2048 points	64 points × 32 sets = 2048 points Note
JW-33CUH2				
JW-33CUH3				

Note: Max. 32 sets of 64-point modules can be mounted. Therefore, when 32 sets of the 32-point/64-point module are mounted, the total number of points will be 3072. (32 points x 32 sets + 64 points x 32 sets = 3072 points)

(12) Directions of data memory

The JW30H shares the same groups of modules as the JW20H, but its allocation of data memory is different.

1. Special I/O modules

<table>
<tr><th></th><th>JW30H</th><th>JW20H</th></tr>
<tr><td>Number of special I/O modules installed (per control module)</td><td>Up to 32 modules
・Additional 8 modules can be added when a remote I/O slave station is used.
Note: The special I/O module can only be mounted to racks 0 to 3. They cannot be mounted on racks 4 to 7.</td><td>Up to 8 modules</td></tr>
<tr><td>Data memory allocation</td><td>・A 16-byte data memory is allocated to each rack on the rack panel using a module No. switch on the special I/O module.
<table>
<tr><th>Items</th><th>Module No. switches</th><th>Byte addresses</th><th>Parameter areas</th></tr>
<tr><td rowspan="16">Relay for a special I/O (Basic system)</td><td>RO, SW0</td><td>□3000 - □3017</td><td>T-00 (000 - 177)</td></tr>
<tr><td>RO, SW1</td><td>□3020 - □3037</td><td>T-01 (000 - 177)</td></tr>
<tr><td>|</td><td>|</td><td>|</td></tr>
<tr><td>RO, SW7</td><td>□3160 - □3177</td><td>T-07 (000 - 177)</td></tr>
<tr><td>R1, SW0</td><td>□3200 - □3217</td><td>T-10 (000 - 177)</td></tr>
<tr><td>R1, SW1</td><td>□3220 - □3237</td><td>T-11 (000 - 177)</td></tr>
<tr><td>|</td><td>|</td><td>|</td></tr>
<tr><td>R1, SW7</td><td>□3360 - □3377</td><td>T-17 (000 - 177)</td></tr>
<tr><td>R2, SW0</td><td>□3400 - □3417</td><td>T-20 (000 - 177)</td></tr>
<tr><td>R2, SW1</td><td>□3420 - □3437</td><td>T-21 (000 - 177)</td></tr>
<tr><td></td><td>|</td><td>|</td></tr>
<tr><td>R2, SW7</td><td>□3560 - □3577</td><td>T-27 (000 - 177)</td></tr>
<tr><td>R3, SW0</td><td>□3600 - □3617</td><td>T-30 (000 - 177)</td></tr>
<tr><td>R3, SW1</td><td>□3620 - □3637</td><td>T-31 (000 - 177)</td></tr>
<tr><td>|</td><td>|</td><td>|</td></tr>
<tr><td>R3, SW7</td><td>□3760 - □3777</td><td>T-37 (000 - 177)</td></tr>
<tr><td rowspan="4">Relay for a special I/O (Remote I/O slave station)</td><td>SW0</td><td>□4000 - □4017</td><td>T-40 (000 - 177)</td></tr>
<tr><td>SW1</td><td>□4020 - □4037</td><td>T-41 (000 - 177)</td></tr>
<tr><td>|</td><td>|</td><td>|</td></tr>
<tr><td>SW7</td><td>□4160 - □4177</td><td>T-47 (000 - 177)</td></tr>
</table>
The switch numbers in the module No. switch column, from R0 to R3, are the rack numbers on the rack panels.</td><td>・16 bytes each are allocated without defining the rack number on the rack panel.
<table>
<tr><th>Module No. switches</th><th>Byte addresses</th><th>Parameter areas</th></tr>
<tr><td>SW0</td><td>□0200 - □0217</td><td>T-0 (000 - 177)</td></tr>
<tr><td>SW1</td><td>□0220 - □0237</td><td>T-1 (000 - 177)</td></tr>
<tr><td>|</td><td>|</td><td>|</td></tr>
<tr><td>SW7</td><td>□0360 - □0377</td><td>T-7 (000 - 177)</td></tr>
</table></td></tr>
</table>

2. I/O link relay areas of the JW-23LM/23LMH

<table>
<tr><th>JW30H</th><th>JW20H</th></tr>
<tr><td>
<table>
<tr><th>Module No. switches</th><th>Byte addresses</th><th colspan="2">Capacity</th></tr>
<tr><td>SW0</td><td>□2000 - □2077</td><td>64 bytes</td><td rowspan="4">Total of 256 bytes</td></tr>
<tr><td>SW1</td><td>□2100 - □2177</td><td>64 bytes</td></tr>
<tr><td>SW2</td><td>□2200 - □2277</td><td>64 bytes</td></tr>
<tr><td>SW3</td><td>□2300 - □2377</td><td>64 bytes</td></tr>
</table>
</td><td>Totally 64 bytes
from SW0 to SW3 (□0100 - □0177)</td></tr>
</table>

(13) Notes for using communication module, support tool

When you use a JW30H communication module or support tool, check the version you are using carefully. Depending on the version, some limitation on the use may be involved, or it may not be possible to use it.

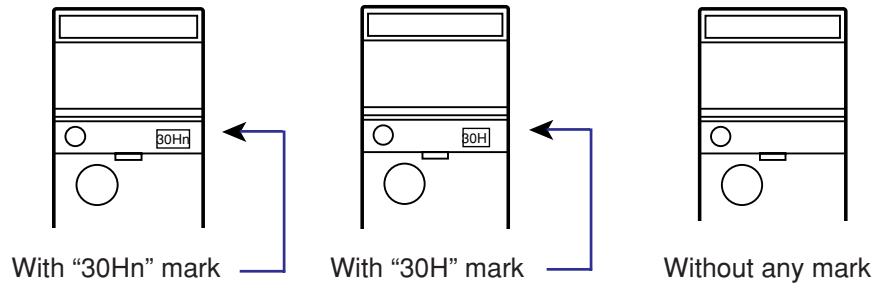
1. Communication modules

The following communication modules may be compatible with or not compatible at all with JW30H depending on their version.

- Modules mounted on the JW30H: JW-21CM, JW-22CM, JW-21MN, JW-23LM, and JW-23LMH
- Modules communicating with JW30H: JW-20CM, JW-20RS, JW-20MN, ZW-98CM, ZW-20AX, JW-98MN, JW-90MN, Z-313J, Z-331J, Z-332J, Z-333J, Z-334J, Z-335J

① A “30Hn” mark is put on modules which are compatible with the JW30H control modules, including JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3 (current models).
② A “30H” mark is put on modules which are compatible with the JW30H control modules, including JW-31CUH/32CUH/33CUH (conventional models).
③ Neither the “30Hn” nor “30H” mark is put on a module that is not compatible with the JW30H. (Compatible with the JW20H only.)

<<In case of JW-21CM>>



Usable functions are as follows:

		Compatibility of modules mounted on the JW30H	Communication with the JW30H
①	With “30Hn” mark	All functions available with all JW30H models	Available communication with all the JW30H modules.
②	With “30H” mark	Available within the functional range of conventional JW30H modules	Communcation available taking for granted that the current JW30H modules function in the same way as a conventional JW30H module.
③	Without “30Hn” or “30H” marks	All functions are unavailable when mounded in the JW30H modules (They do not function)	Communcation available taking for granted that the JW30H modules function in the same way as a conventional JW20H or either of JW50H/70H/100H module. (*1)

*1: A decision taking for granted that a JW30H as whether a JW20H or either of JW50H/70H/100H is subject to the settings of JW30H system memory #260. (# 260 = 50_{HEX}: JW50H/70H/100H, and other than #260 = 50_{HEX}: JW20H)

■ **Classification between JW30H (all models), JW30H (current models), and JW30H (conventional models)**

In this manual, the JW30H series control modules are classified as follows:

Model classification		Control module
JW30H (all models)	JW30H (current model)	JW-31CUH1 JW-32CUH1 JW-33CUH1 JW-33CUH2 JW-33CUH3
	*2 JW30H (conventional model)	JW-31CUH JW-32CUH JW-33CUH

*2: JW30H (conventional models) are discontinued production.

2. Support tool

The following support tools may be compatible with or not compatible at all with JW30H depending on their versions.

- Hand-held programmer: JW-13PG
- Multi-purpose programmer: JW-50PG
- Ladder software: JW-50SP

See page 3-5 in details about support tool.

(14) Input/output module (JW-211NA/212NA/214NA/212SA/213SA/214SA)

Input modules (JW-211NA/212NA/214NA) and output modules (JW-212SA/213SA/214SA) are upgraded models (covered functions of the conventional models) of conventional modules (JW-211N/212N/214N, JW-212S/213S/214S) (discontinued production). => See “11-4. Specifications of I/O module.”

■ **Comparison with the conventional models**

Product name	Model name	Corresponding conventional model	Major functions
Input module	JW-211NA	JW-211N	16-point input 100/200 VAC
	JW-212NA	JW-212N	16-point input 12/24 VDC
	JW-214NA	JW-214N	16-point input 12/24 VDC (high-speed type)
Output module	JW-212SA	JW-212S	16-point output 5/12/24 VDC, 0.5 A trainsistor output (sink output)
	JW-213SA	JW-213S	16-point output 100/200 VAC, 1.0 A triac output
	JW-214SA	JW-214S	16-point output 250 VAC / 30 VDC, 2 A relay output

[Changed points]

Changed points from the conventional models are as follows:

■ **All models**

Improved view angle of the LED display (top of the module) to wide view angle type.

■ **JW-212SA/213SA**

Added “fuse blow indication (FUSE)” on the LED display. Changed rated capacity and rated maximum load current (JW-213SA) of the installed fuse.

- JW-212SA

Item	JW-212SA	Conventional model (JW-212S)
Blown fuse indication (LED display)	Available (FUSE) *2	Not avaialble
Fuse specifications (1 common)	3.15 A	3 A

- JW-213SA

Item	JW-213SA	Conventional model (JW-213S)
Blown fuse indication (LED display)	Available (FUSE) *2	Not avaialble
Fuse specifications (1 common)	3.15 A	3 A
Maximum load current	1.0 A/point, 2A/common	0.5 A/point, 2A/common

*2: The JW-212SA/213SA displays fuse blow (FUSE) using an LED. However, this is only indication and the JW20H/30H control module cannot detect this fuse blow. In addition, the users cannot replace the installed fuses. Ask our sales agent for replacement of the fuses.

(15) Special I/O modules

If a preset scanning time is too short (less than 2 ms), the special I/O module such as JW-21SU may not function normally.

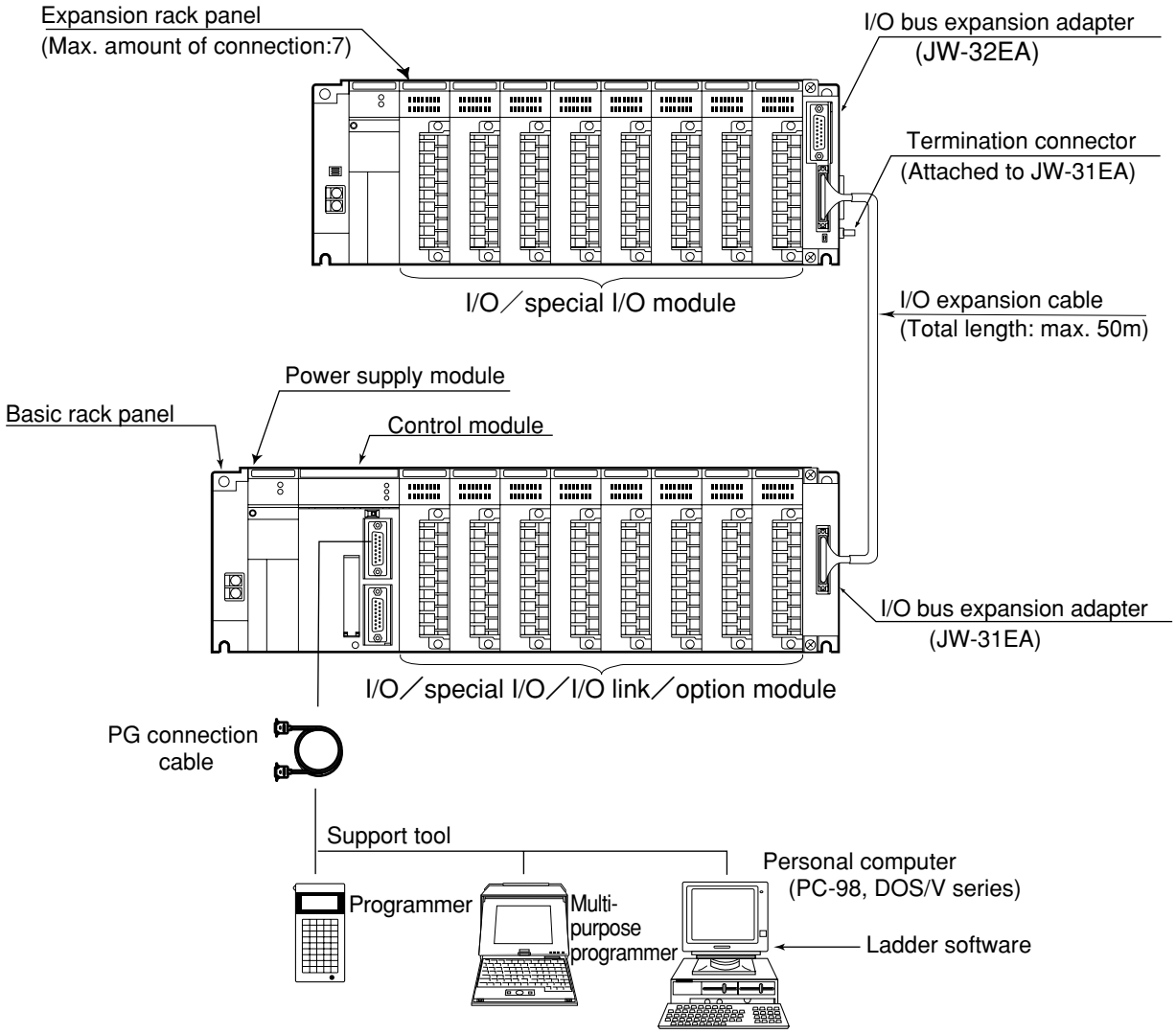
To avoid this malfunction, set a longer scanning time using a constant scanning (set 3 ms or more on the system memory #226) or other functions.

(16) Insulation resistance and dielectrical strength tests of the power supply module

When testing insulation resistance or dielectrical strength of the JW-21PU/31PU power supply modules, be sure to remove the short bar connected between the SHORT terminal and the GND terminal. If a test is carried out without removing the short bar, internal elements of the module may be damaged.

Chapter 3. System configuration

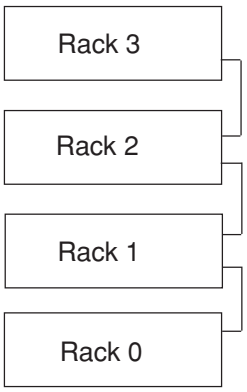
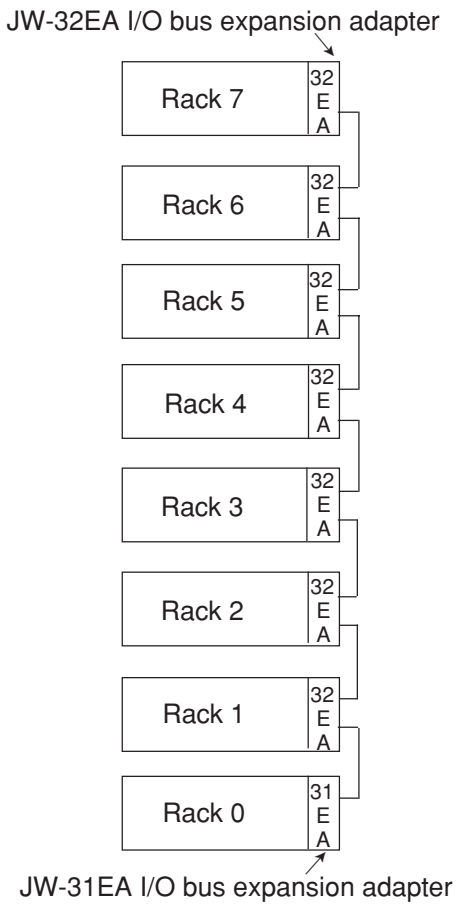
3-1 Basic system configuration



Number of rack panels connected	Max. 8 sets in total of 1 basic rack panel and 7 expansion rack panel. (In case of using the basic rack panel JW-34KB/36KB/38KB, expansion rack panel JW-34ZB/36ZB/38ZB, and I/O bus expansion adapter JW-31EA/32EA.)
Number of mounting of I/O module, special I/O module, I/O link module, and option module	Total of 64 sets can be mounted • Max. of 64 I/O modules can be mounted including both the basic and the expansion rack panels (racks 0 to 7). • Max. of 32 special I/O modules can be mounted including both the basic and the expansion rack panels (racks 0 to 3). • Max. of 4 I/O link modules can be mounted on the basic rack panel. • Max. of 7 option modules can be mounted on the basic rack panel.

Note: System can be configured without using an I/O bus expansion adapter. (See the next page.)

■ The difference between using I/O bus expansion adapter and not using it

	When not using I/O bus expansion adapter	When using I/O bus expansion adapter
System configuration		
Basic rack panel	JW-24KB/26KB/28KB JW-34KB/36KB/38KB	JW-34KB/36KB/38KB
Expansion rack panel	JW-34ZB/36ZB/38ZB	JW-34ZB/36ZB/38ZB
I/O bus expansion adapter	–	JW-31EA (Install in basic rack panel) JW-32EA (Install in all expansion rack panel)
I/O expansion cable	JW-203EC/207EC/22EC/25EC/210EC	JW-05EC/1EC/3EC/10EC/20EC/30EC/ 50EC
No. of racks	4 racks max.	8 racks max.
Cable total length distance	14 m max. (Max. 10 m between rack panels)	50 m max. (Max. 50 m between rack panels)
No. of I/O modules	Max. 32 sets for basic/expansion rack panel (racks 0 to 3)	Max. 64 sets for basic/expansion rack panel (racks 0 to 7)
No. of special I/O modules	Max. 32 sets for basic/expansion rack panel (racks 0 to 3)	Max. 32 sets for basic/expansion rack panel (racks 0 to 3)
No. of I/O link modules	Max. 4 sets for basic rack panel (rack 0)	Max. 4 sets for basic rack panel (rack 0)
No. of option modules	Max. 7 sets for basic rack panel (rack 0)	Max. 7 sets for basic rack panel (rack 0)
Connection support tool with expansion rack panel	Unavailable	Available for connected I/O bus expansion adapter JW-32EA

(1) Control module

Model name	No. of In/Out	Program size	File register	Clock feature, communication port
JW-31CUH1	512 points	7.5K words	None	None
JW-32CUH1	1024 points	15.5K words	80K bytes	Yes
		31.5K words	48K bytes	
JW-33CUH1	3072 points	31.5K words	144K bytes	Yes
JW-33CUH2	3072 points	63K words	464K bytes	Yes
JW-33CUH3	3072 points	63K words	2000K bytes	Yes

Set program capacity and file register capacity of the JW-32CUH1 using the internal switch (SW2) of the module.

(2) Power supply module

Model name	Specification	Approved UL/CSA	Approved CE
JW-21PU	85 to 264 VAC. Power capacity: 5 VDC 3.5 A		
JW-22PU	20.4 to 32 VAC. Power capacity: 5 VDC 3.5 A		
JW-31PU	85 to 132 VAC. Power capacity: 5 VDC 3.5 A	O	
JW-33PU	85 to 264 VAC. Power capacity: 5 VDC 4.5 A	O	O

(3) Basic/expansion rack panel

Model name	No. of slots			I/O bus expansion adapter (Installation of JW-31EA)
	For power supply module	For Control module	For I/O module	
JW-24KB	1	1	4	Unavailable
JW-26KB	1	1	6	
JW-28KB	1	1	8	
JW-34KB	1	1	4	Available
JW-36KB	1	1	6	
JW-38KB	1	1	8	

The slot for I/O module is a slot mounting I/O, special I/O, I/O link, and option module.

(4) Expansion rack panel

Model name	No. of slots		I/O bus expansion adapter (Installation of JW-32EA)
	For power supply module	For I/O module	
JW-34ZB	1	4	Available
JW-36ZB	1	6	
JW-38ZB	1	8	

The slot for I/O module is a slot mounting I/O, special I/O module.

(5) I/O bus expansion adapter

Model name	Specifications
JW-31EA	Mounting to basic rack panel (JW-34KB/36KB/38KB)
JW-32EA	Mounting to expansion rack panel (JW-34ZB/36ZB/38ZB), with PG port

Use an I/O bus expansion adapter when more than 5 racks on the rack panel are used, or when total length of I/O expansion cables is longer than 15 meters (max. 50 meters).

The conventional model of JW30H series (JW-31CUH/32CUH/33CUH) cannot use the I/O bus expansion adapter.

(6) I/O ／ special I/O ／ I/O link ／ option module

		Model name	Specifications
	I/O *1	JW-201N	8 points input, 100/120 VAC
		JW-202N	8 points input, 12/24 VDC
		JW-203N	8 points input, 200/240 VAC
		JW-211NA	16 points input, 100/120 VAC
		JW-212NA	16 points input, 12/24 VDC
		JW-214NA	16 points input, 12/24 VDC (high speed type)
		JW-234N	32 points input, 12/24 VDC (high speed type, connector connection)
		JW-202S	8 points output, 5/12/24 VDC, 1A, transistor output (sink output)
		JW-203S	8 points output, 100/200 VAC, 1A triac output
		JW-204S	8 points output, 250 VAC/30 VDC, 2A relay output (separated common)
		JW-212SA	16 points output, 5/12/24 VDC, 0.5A, transistor output (sink output)
		JW-213SA	16 points output, 100/200 VAC, 1A triac output
		JW-214SA	16 points output, 250 VAC/30 VDC, 2A, relay output
		JW-232S	32 points output, 5/12/24 VDC, 0.1A, transistor output (sink output, connector connection)
		JW-232M	16 points input, 12/24 VDC 16 points output, 5/12/24 VDC, 0.1A, transistor output (sink output, connector connection)
	Special I/O	JW-264N	64 points input, 24 VDC (high speed type, connector connection)
		JW-262S	64 points output, 5/12/24 VDC, 0.1A, transistor output (sink output, connector connection)
		JW-21HC	High speed counter: 100 kHz 1ch
		JW-22HC	High speed counter: 100 KHz/200 KHz 2ch
		JW-24AD	Analog input: 4 points 13 bits
		JW-22DA	Analog output: 2 points 16 bits
		JW-22DU	ID control: Microwave/optical system
		JW-21SU	Serial interface 1ch RS-232C/422A
		JW-21PS	Pulse output, number of control axis: 1. Max speed: 250 kpps.
*2	I/O link	JW-23LMH	I/O link master station, up to 32 slave stations, max. 504 points, 345.6 kbits/s / 172.8 kbits/s
*2	Option	JW-21CM	Select from computer link / data link / remote I/O functions by switching.
*2		JW-22CM	Net work module
*2		JW-21MN	ME-NET module
*2		JW-25CM	JW10 link module
*2		JW-255CM	Ethernet module
*2		JW-20FL5	FL-net module
*2		JW-20FLT	
*2		JW-20DN	DeviceNet master module
	JW-21RS		Remote I/O slave module

*1: Input module JW-211NA/212NA/214NA and output modules JW-212SA/213SA/214SA are function improved models (cover the functions of conventional models) of JW-211N/212N/214N and JW-212S/213S/214S. => See page 2-5.

*2: Make sure to use the JW30H series applicable products for the JW-23LMH, JW-21CM, JW-22CM, and JW-21MN. Items applicable with the JW30H series are stuck [30Hn] mark in front of the modules. => See page 2-4.

(7) Support tools

Model name		Outline	Remarks
Hand-held programmer	JW-14PG	LCD dot matrix display	----------
	JW-13PG		See the table in the next page for versions
	JW-12PG		Usable within the functions of the JW20H or JW50H/70H/100H.*2
	JW-2PG*1		Usable within the functions of the JW20H.*2
Multi-purpose programmer	JW-50PG	LCD display (640 x 480 dot) Built-in 1 set of 3.5" floppy disk drive Built-in 1 set of 2.5" hard disk (256MB)	See the table in the next page for versions.
Ladder processr II	Z-100LP2S + Z-3LP2ES (Expansion module)	EL display Horizontal: 11 relay contacts plus 1 coil Vertical: 11 relay lines plus 2 message lines Built in 1 set of 3.5" floppy disk drive.	Usable within the functions of the JW20H or JW50H/70H/100H when Z-3LP2ES is installed. (Ver 5.2 or more)
Ladder software	JW-92SP	Ladder software for PC-98 series, Japanese display	See the table in the next page for versions
	JW-52SP	Ladder software for DOS/V personal computer, Japanese display	See the table in the next page for JW30H applied versions.
	JW-50SP	Ladder software for IBM-PC	See the table in the next page for JW30H applied versions.
	JW-100SP	Ladder logic programming software	----------

*1 When JW-2PG is used by JW30H, be sure to set 02_{HEX} on the system memory #136 of JW30H.

*2: Forced set/reset, data transfer using a ROM writer, and data transfer using cassette tapes are not available.

Note: Do not connect to the programmer ZW-101PG1, or malfanction may be caused.

■ **Description of software version approved to JW30H**

The following support tools may, or may not be compatible with JW30H depending on their versions.

Items	Model names	Versions	Available functions when used with JW30H
Hand-held programmer	JW-13PG	With “B” mark	All functions are available with all JW30H modules.
		With “A”, or without marks	Usable within the function range of the conventional JW30H modules.
Multi-purpose programmer	JW-50PG	Ver5.5 or later	All functions are available with all JW30H modules
		Ver5.0 to 5.3A	Usable within the functional range of the conventional JW30H modules
		Ver4.0A or earlier	Usable but it operaties taking for granted that the JW30H is a JW20H, or either of JW50H/70H/100H. (*3)
Ladder software	JW-52SP	Ver5.5 or later	All functions are available with all JW30H modules
		Ver5.0 to 5.3A	Usable within the functional range of the conventional JW30H modules.
	JW-92SP	Ver5.5 or later	All functions are available with all JW30H modules.
		Ver5.0 to 5.3A	Usable with the functional range of the conventional JW30H modules.
		Ver4.0A or earlier	Usable but it operaties taking for granted that the JW30H as a JW20H, or either of JW50H/70H/100H. (*3)
	JW-50SP	Ver5.5I or later	All functions are available with all JW30H modules
		Ver5.0I to 5.3AI	Usable with the functional range of the conventional JW30H modules (*2)
		Ver3.0I	Usable taking for granted that the JW30H as a JW20H, or either of JW50H/70H/100H. (*3)

*3: A decision taking for granted that a JW30H as whether a JW20H or either of JW50H/70H/100H is subject to the settings of JW30H system memory #260. (# 260 = 50_{HEX}: JW50H/70H/100H, and other than #260 = 50_{HEX}: JW20H)

This version cannot perform forced set/reset of relays and sampling trace.

- The JW-14PG and JW-100SP can use their all functions with all JW30H series models.
- For details about the JW30H (all models) and JW30H (conventional models), see page 2-6.

(8) I/O expansion cable

Model name	Specifications		Accessories
JW-203EC	Connection cables between a basic rack panel and an expansion rack panel, or between expansion rack panels.	30 cm	5 V DC cable (30cm)
JW-207EC		70 cm	5 V DC cable (70cm)
JW-22EC		2 m	5 V DC cable (2m) Short connector
JW-25EC		5 m	Short connector
JW-210EC		10 m	Short connector
JW-05EC	Connection cables between a JW-31EA and a JW-32EA, or between a JW-32EA and a JW-32EA.	50 cm	5 V DC cable (50cm)
JW-1EC		1 m	5 V DC cable (1m)
JW-3EC		3 m	None
JW-10EC		10 m	None
JW-20EC		20 m	None
JW-30EC		30 m	None
JW-50EC		50 m	None

(9) PG connection cable

Model name	Specifications
JW-22KC	Connection cable between a support tool and the JW30H. 2 m
JW-24KC	Connection cable between a support tool and the JW30H. 4 m *

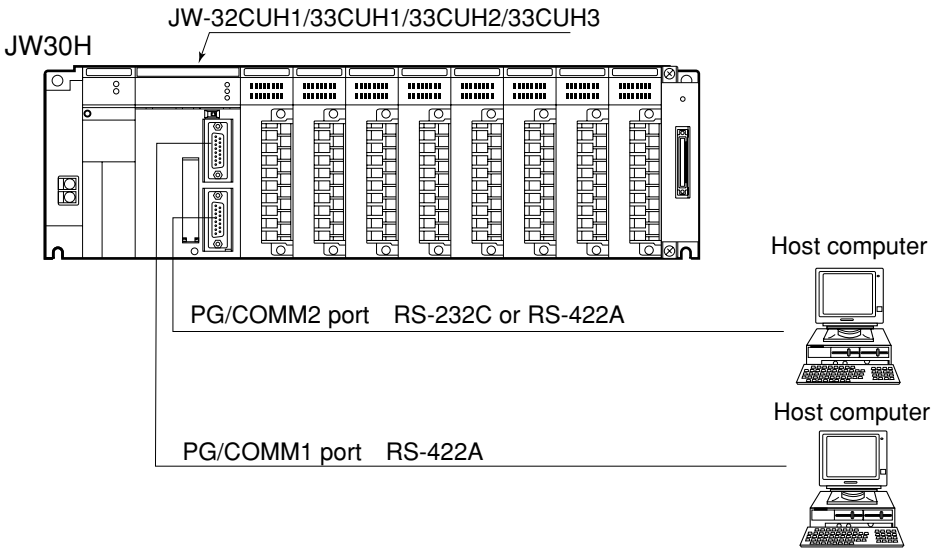
* JW-24KC cannot be used with JW-2PG.

3-2 System configuration using communication

Refer to the each module instruction manual or user's manual about each communication module (I/O link, option module).
Use the product conforming to JW30H. See the page 2-6 concerning JW30H applied modules.

[1] Communication system using communication port

- By using a communication port of the control module, the JW30H can communicate with a host computer such as a personal computer and a liquid crystal control terminal.
- JW-32CUH1/33CUH1/33CUH2/33CUH3 have 2 ports (PG/COMM1, PG/COMM2) for communication port. JW-31CUH1 doesn't have function of communication port.



Item	Specifications	
	RS-232C connection	RS-422A connection
JW30H No. of connected sets	1 sets (1:1 connection)	Max. 31sets (1:N connection)
Communication line	Shielded cable Max.15m	Shielded twisted pair cable Cabletotal length: max. 1 km 4-wire system (Party line connection)
Transfer rate	115200/57600/38400/19200/9600/4800/2400/1200 bits／s	
Data style	Start bit : 1 bits Data length : 7 bits Parity bit : 1 bit (odd/even/none) Stop bit : 1/2 bits	
Character used	ASCII, alphanumeric characters	

- For operational details of communication port, see page 7-24 to 45.

[2] Communication system using link module (JW-21CM)

- The JW-21CM can use any of the following 4 functions by setting its internal switch.

Functions	Total number of mountable modules
① Computer link	Up to 7
② Data link DL1 (N:M method)	Up to 6 (total of master and slave stations)
③ Data link DL9 (I:N method)	Up to 6 (total of master and slave stations)
④ Remote I/O master station	Up to 1

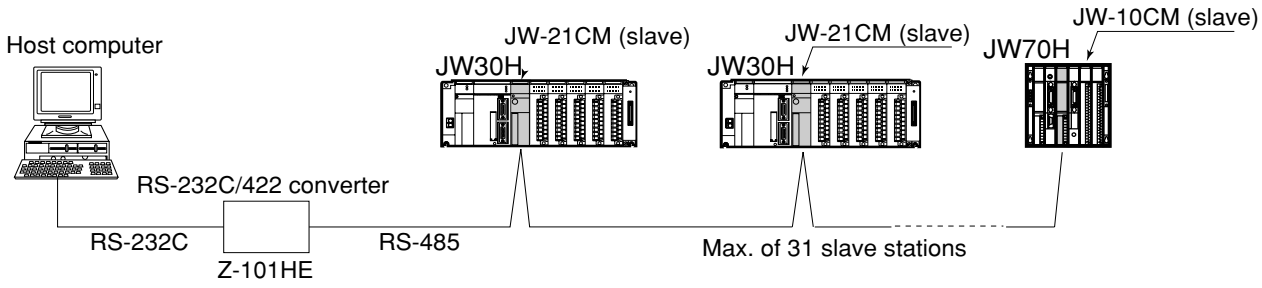
- The JW-21CM is an option module, and up to 7 modules of JW-21CM (including other option modules) can be mounted only on a basic rack panel. Total number of mountable modules varies according to the functions to be used, as shown above.

(Mounting example)

Computer link	: 2
Data link DL1 (N:M method)	: 2
Data link DL9 (I:N method)	: 2
Remote I/O master station	: 1
Total	7

(1) Computer link

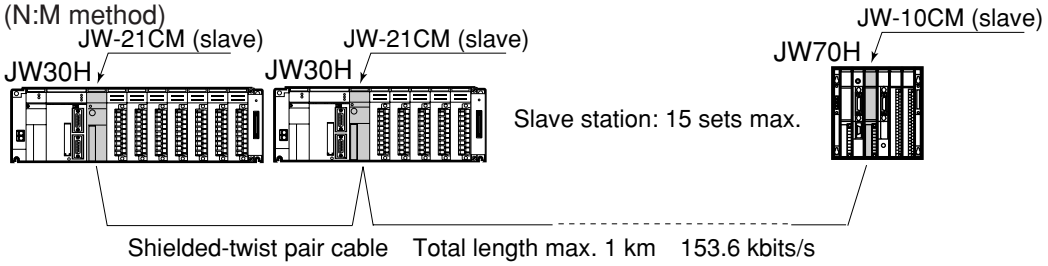
- This link offers communication between a host computer as a master station and a JW-21CM as a slave station.



Items	Specifications
Names of slave stations (PC)	JW-21CM (JW20H/JW30H) JW-10CM (W70H/100H, JW50H/70H/100H) ZW-1K0CL2 (W100), ZW-501CL2(W51), ZW-160CL2(W16), ZW-10CL2 (W10), and Z-331J/332J (J-board)
Numbers of slave stations connected	Up to 31 modules (1:N connection)
Communication line cables	A shielded-twist pair cable. Max. length: 1 km. 2 lined type/4 lined type.
Transfer speed (baud rate)	19200/9600/4800/2400/1200/600/300 bits / s
Data formats	Start bit: 1 bit Data length: 7 bits Parity bits: 1 bit (odd/even) Stop bit: 2 bits
Used characters	ASCII alphanumerical characters

(2) Data-link DL1

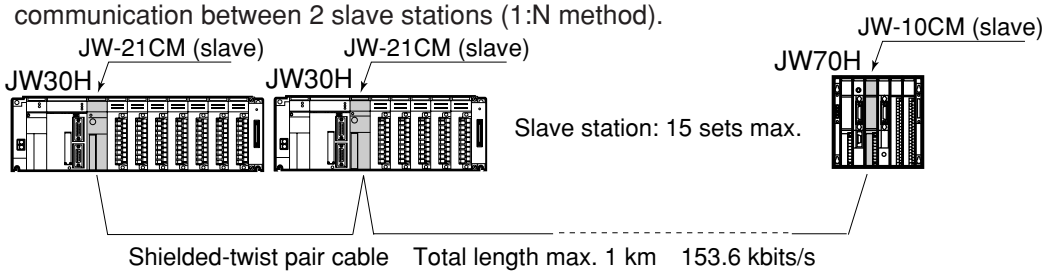
- The system communicates between the JW30H and W/JW series PC through the JW-21CM as a master or a slave station.
- This link offers communication between a master and a slave station, or between 2 slave stations. (N:M method)



Item	Specifications
Model name of master/slave station	JW-21CM (JW20H/JW30H) JW-10CM (W70H/100H, JW50H/70H/100H) ZW-501DL1(W51), ZW-160DL1 (W16), Z-331J/332J (J-board)
No. of connected stations	Max. 16 stations (Including master station)
No. of link bytes	Total 64 bytes (512 points)
No. of link bytes per station	• Divided equally according to the number of slave stations when a JW-21CM or a Z-331J/332J is used as master station. (1 station: 32 bytes, 2 or 3 stations: 16 bytes each, 4 to 7 stations: 8 bytes each, and 8 to 15 stations: 4 bytes each.) • When master station is other than JW-21CM, or Z-331J/332J, up to 64 bytes will be allocated.

(3) Data-link DL9

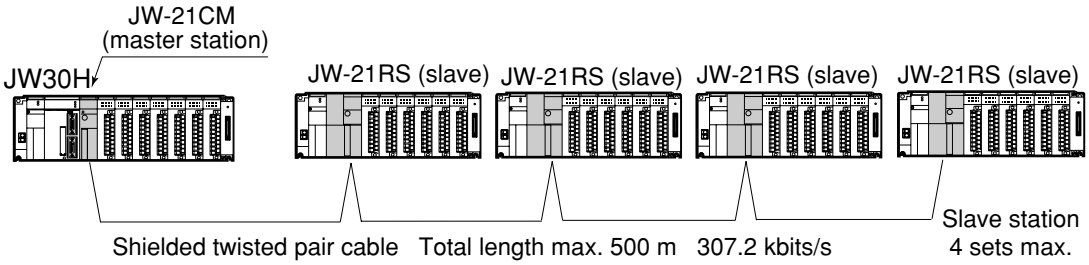
- The system communicates between the JW30H and W/JW series PC through the JW-21CM as a master or a slave station.
- This link offers communication between a master and a slave station. It cannot perform communication between 2 slave stations (1:N method).



Item	Specifications
Model name of master/slave station	JW-21CM (JW20H/JW30H) JW-10CM (W70H/100H, JW50H/70H/100H) ZW-1K0DL9 (W100), ZW-501DL9(W51), ZW-160DL9 (W16) Z-331J/332J (J-board)
No. of slave stations connected	Max. 15 sets
No. of link bytes	• Select from 512/256/128/64 bytes when a master station is a JW-21CM, or Z-331J/332J. • When a master station is other than a JW-21CM, or Z-331J/332J, up to 512 bytes will be allocated.
No. of link bytes per station	• Divided equally according to the number of slave stations when a JW-21CM or a Z-331J/332J is used as master station. (1or 2 stations: 128 bytes each, 3 or 4 stations: 64 bytes each, 5 to 8 stations: 32 bytes each, and 9 to 16 stations: 16 bytes each. • When master station is other than JW-21CM, or Z-331J/332J, total of max. 127 bytes will be allocated.

(4) Remote I/O master station

- The system can communicate between a JW-21CM as remote I/O master station and a W/JW series module as remote I/O slave station.



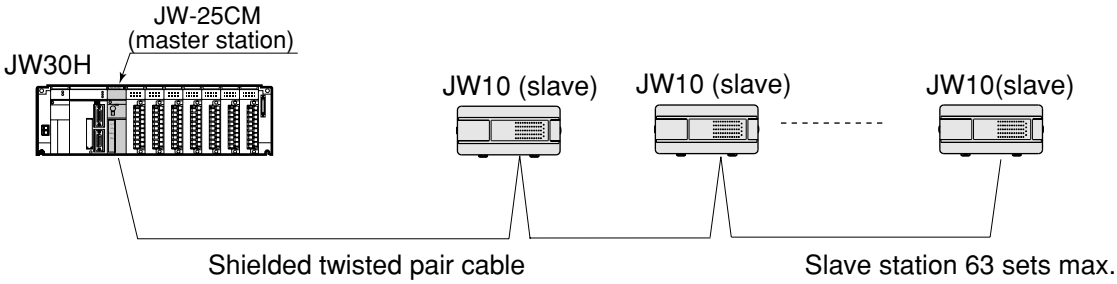
Items	Specifications
Model name of slave station	JW-21RS (JW20H/JW30H) ZW-501RS1 (W51), ZW-160RS1 (W16), ZW-10RS1 (W10)
Number of slave stations connected	Max. 4 sets
Number of remote I/O points	Total point max. 512 (64 bytes)
Number of I/O points per station	128 points (16 bytes)
Number of special I/O modules mounted on a JW-21RS	Max. 8 (Total of 4 slave stations)

[3] Communication system using a JW10 link module (JW-25CM)

- The JW-25CM can communicate with the JW10, by selecting data link master station function or remote I/O master station function.
- The JW-25CM is an option module, and up to 7 modules of JW-25CM (including other option modules) can be mounted only to a basic rack panel.

(1) Data link master station

- The system can communicate between a JW-25CM, a master station, and a JW10, slave station.
- This communication system can only communicate between a master and a slave station. It cannot communicate between 2 slave stations.



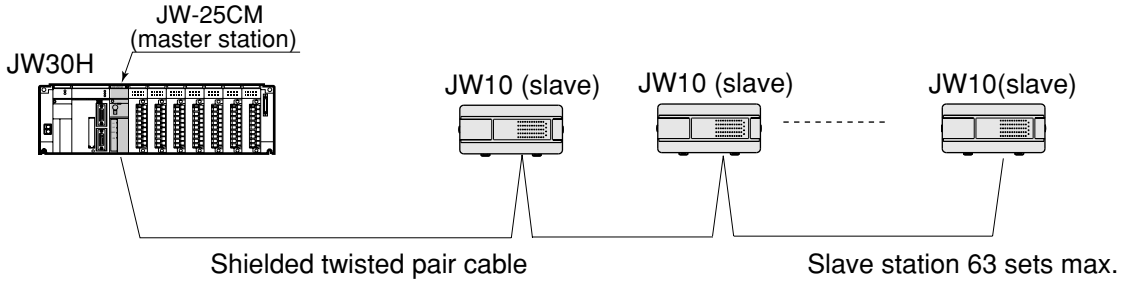
- Total expansion length and max. number of slave stations connected (JW10) are subject to the settings of communication speed.

Communication speed	Total expansion length	Number of slave stations connected
76800 bits/s	Max. 500 m	Max. 31
38400 bits/s	Max. 1 km	Max. 63

Items	Specifications
Model name of slave station	JW-1324K/1424K/1624K (JW10 basic modules)
Number of transmission bytes per station	8 bytes each for receiving and sending.

(2) Remote I/O master station

- The system can communicate between a JW-25CM as a remote I/O master station and a JW basic module as a remote I/O slave station.
- Whether or not to synchronize a data exchange between a master and a slave station with operation can be selected.



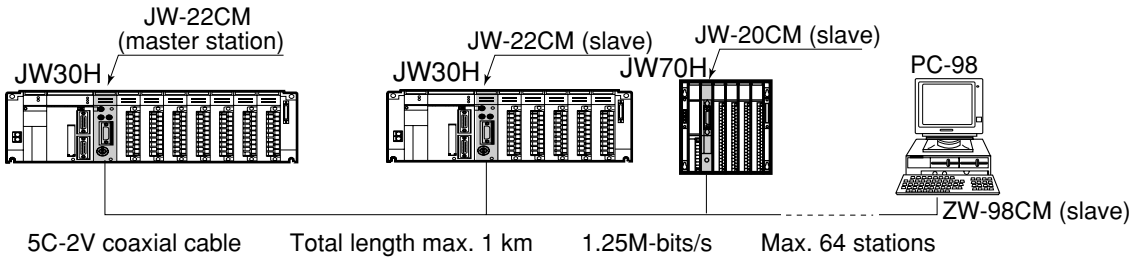
- Total expansion length and max. number of slave stations connected (JW10) are subject to the settings of communication speed.

Communication speed	Data exchange timing	Total expansion length	No. of slave stations connected
76800 bits/s	Synchronous/ asynchronous	Max. 500 m	Max. 31
38400 bits/s	Synchronous	Max. 1 km	Max. 16
	Asynchronous	Max. 1 km	Max. 63

Items	Specifications
Model name of slave station	JW-1324K/1424K/1624K (JW10 basic modules)
Number of I/O points per station	Max. 60 points (36 for inputs, 24 for outputs)

[4] Communication system using the satellite net module (JW-22CM)

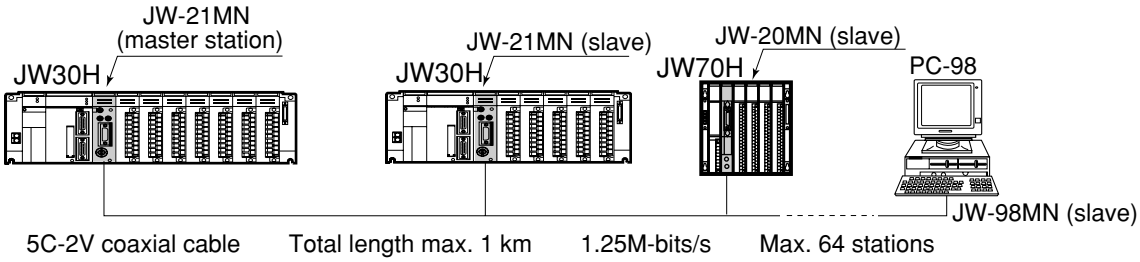
- The system can communicate between JW series PCs or between personal computers by mounting a JW-22CM on a JW30H.
- It can realize data linking (N:M method) and computer linking on the same communication line.
- The JW-22CM is an option module, and up to 7 modules (including other option modules) can be mounted only to a basic rack panel.



Items	Specifications
Name of connected models (PC, personal computer)	JW-22CM (JW20H/JW30H) JW-20CM (W70H/100H, JW50H/70H/100H), Z-335J (J-board) ZW-98CM (PC98), ZW-20AX (IBM/PC, DOS/V)
No. of connected stations	Max. 64 stations
No. of link bytes	Relay link: max. 2048 points (64 bytes) Register link: max. 2048 bytes
No. of bytes linked per station	Relay link: max. 2048 points (64 bytes) Register link: max. 2048 bytes

[5] Communication system using a ME-NET (JW-21MN)

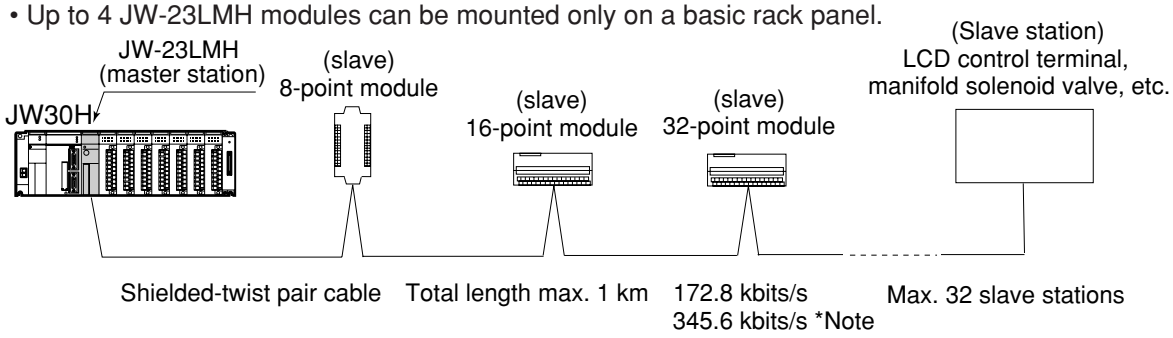
- The system can communicate between systems supporting the ME-NET specifications (PCs, personal computers, robot controllers, etc.) by mounting a JW-21MN to a JW30H.
- It can offer data linking (N:M method) and computer linking on the same communication line.
- The JW-21MN is an option module, and up to 7 modules (including other option modules) can be mounted only to a basic rack panel.



	Specifications
Name of connected models (PC, personal computer)	JW-21MN (JW20H/JW30H) JW-20MN (W70H/100H, JW50H/70H/100H), Z-334J (J-board) ZW-98MN (PC98), JW-90MN (IBM/PC, DOS/V), etc.
No. of connected stations	Max. 64 stations
Number of linked bytes per station	Relay link: Max. 2048 points (64 bytes) Register link: Max. 2048 bytes
Number of transmission bytes per station	Max. 1024 bytes total of relay link and register link

[6] Communication system using the satellite I/O link (JW-23LMH)

- The system can communicate between a JW-23LMH as an I/O link master station and an I/O link slave module.
- Up to 4 JW-23LMH modules can be mounted only on a basic rack panel.



*Note: The communication speed of 345.6 kbits/s can be achieved only when in communication with following high speed type slave module.

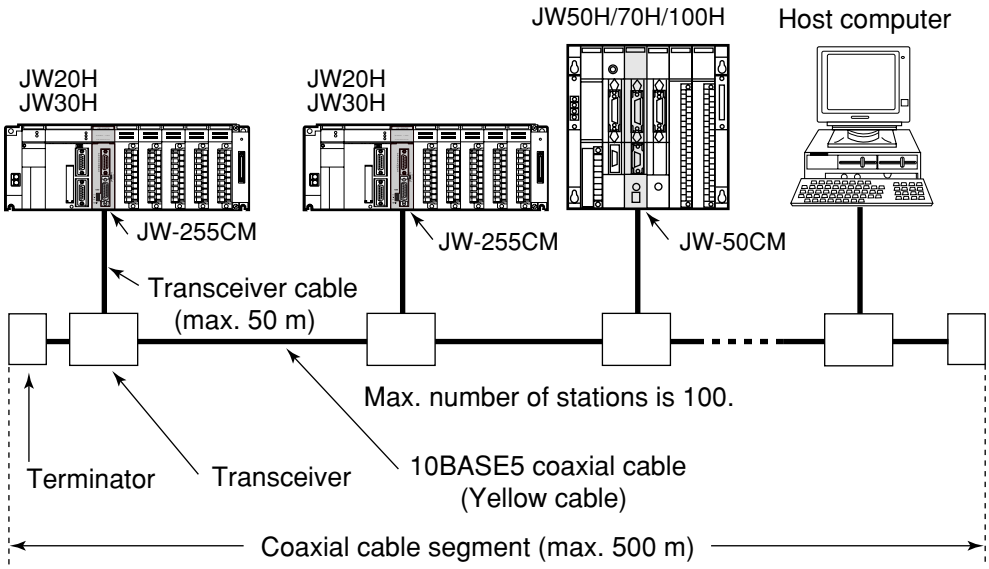
Item	Specifications
Model name of slave station	8-point module: ZW-82N (input), ZW-82S (output) 16-point module: ZW-161N/162N (input), ZW-161S/162S/164S (output), ZW-162M(I/O) 16-point module (high speed type): ZW-164NH (input), ZW-162SH (output), ZW-162MH (I/O) 32-point module (high speed type): ZW-324NH (input), ZW-322SH (output), ZW-322MH (I/O) 8-point module (sensor connector type): ZW-84NC (input) 16-point module (sensor connector type): ZW-162MC (I/O) LCD control terminal: Z-SM10
Number of slave stations connected	Max. 32 stations
Number of I/O link points	Max. 504 points

[7] Communication system using the Ethernet (JW-255CM)

Install the JW-255CM on the JW30H, and connect it to a transciever using a transciever cable, you can exchange data with a host computer or any LAN system in the network, on the Ethernet *1.

- Both TCP/IP and UDP/IP protocols are available.
- Data communication is possible between host computers in an Ethernet network and PCs in a satellite network or on an FL-net spanning two layers of hierarchy.
- Communication is possible by up to 8 nodes with one JW-255CM.
- Data can be exchanged between SHARP PCs using SHARP's unique SEND/RECEIVE function.
- Using the subnet mask routing function, the JW-255CM can communicate with a large network system through a router.

* Ethernet is a trademark of the Xerox Corporation.



Item		Specifications
Connection with network		D-SUB15 pins connector
Transfer speed		10M bits/s
Physical topology		Bus
Transmission device		50 ohms coaxial cable
Transmission method		Baseband
Max. No. of transfer length		500 m/segments 2.5 km/network *2
Station interval		2.5 m or more
Max. No. of stations		100 sets/segments
Protocol structure	Application	Sharp computer link/original command
	Transport	TCP/UDP
	Network	IP (ARP)
	Data link	Ethernet V2
No. of connections		8
Application		Computer link functtion,send/recieve functions, routing function

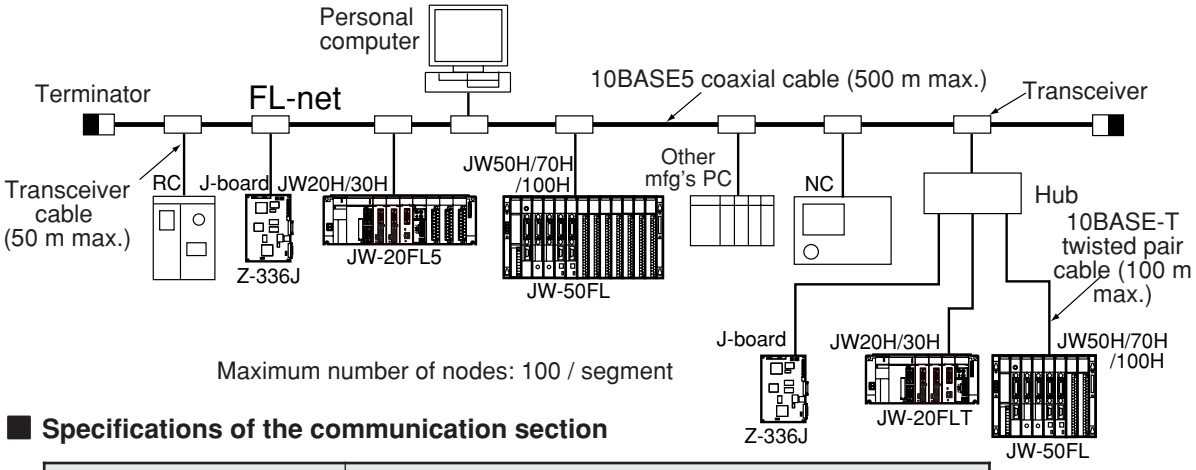
*2: The max. number of transfer length between stations connecting multi segments with the repeater.

[8] Communication system using FL-net (JW-20FL5/T)

The JW-20FL5 (for 10BASE5) and JW-20FLT (for 10BASE-T) are modules for the "FL-net" *1 next generation control system network. They facilitate connection with different devices such as NC and industrial robot as well as other manufacturers' PC.

- Entrance (alt. registration, join) to a network is simple by a node automatic entrance and removal function.
- Perform interlock between devices, transfer production instruction, and collection of production result on a single circuit.
- Easy maintenance thanks to data exchange using SHARP's unique SEND/RECEIVE instruction and remote programming and monitor functions.

*1: "FL-net (FA LINK Protocol Network) is an open FA network system that was suggested by the Japan FA Open Promotion committee (JOP) in the Production Science Center (governmental foundation) as a shared standard in the field.



■ **Specifications of the communication section**

Item	Specifications	
	JW-20FL5	JW-20FLT
Connection to network	10BASE5	10BASE-T
Physical topology	Bus	Star
Data transfer media	50 ohm yellow cable	10BASE-T twisted pair cable
Maximum data transfer distance between stations	500 m / segment 2.5 km / network *2	10 m / segment 500 m / network *3
Data transfer speed	10 Mbps	
Data transfer system	Base band	
Protocol configuration Application Transport Network Data link	 FA link protocol UDP IP Ethernet V2	

*2: The maximum data transfer distance between stations when more than one segment are connected using a repeater.

*3: The maximum data transfer distance between stations when multiple 10BASE-T segments are connected using a hub.

■ **FL-net specifications**

Item	Specifications
Communication control method	Masterless, token system
Number of connecting stations	Maximum 254
Communication function	Cyclic data transfer (n: n, 8 k-bits + 8 K-words) Message transfer (1:1, 1: n) Maximum data length of one frame: 1 K-bytes

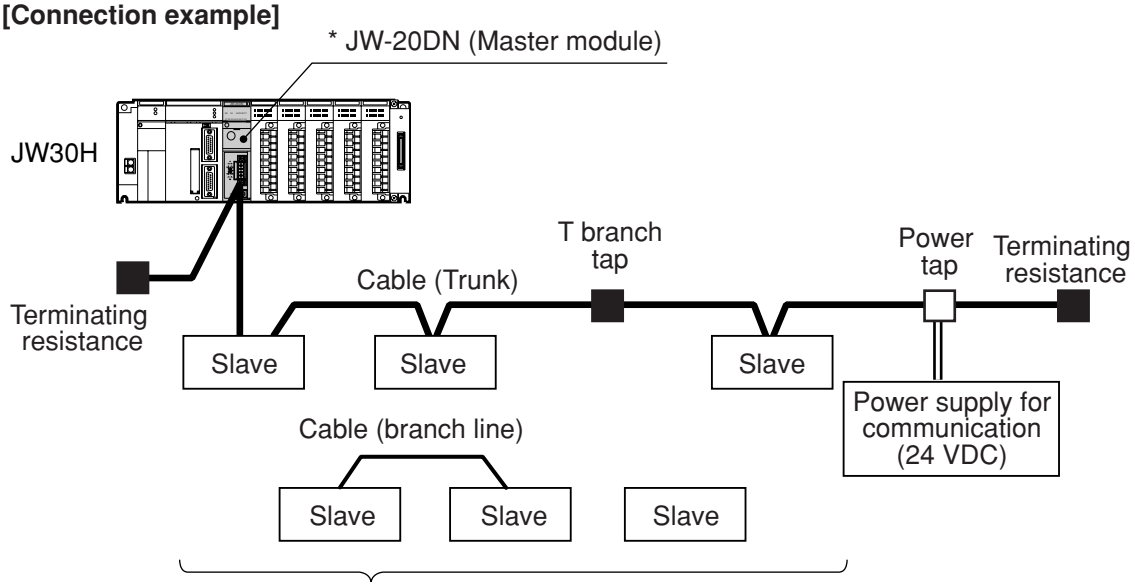
[9] Communication system using the JW-20DN DeviceNet

The JW-20DN conforms to the DeviceNet * and can connect various slave stations. It can share other facilities inside/outside Japan.

- It employs multi-drop system that can connect between nodes using a single special cable. Therefore, it offers much wire saving. Branching using a T-branch tap is also available.
- One PC can install maximum four JW-20DNs. Shortening communication time or separation of systems by dividing systems is possible.
- The editing function of scan list facilitate easy allocation of slave station I/O addresses. There is no need configurator.

* DeviceNet is a trademark of the ODVA (Open Device Vendor Association).

[Connection example]

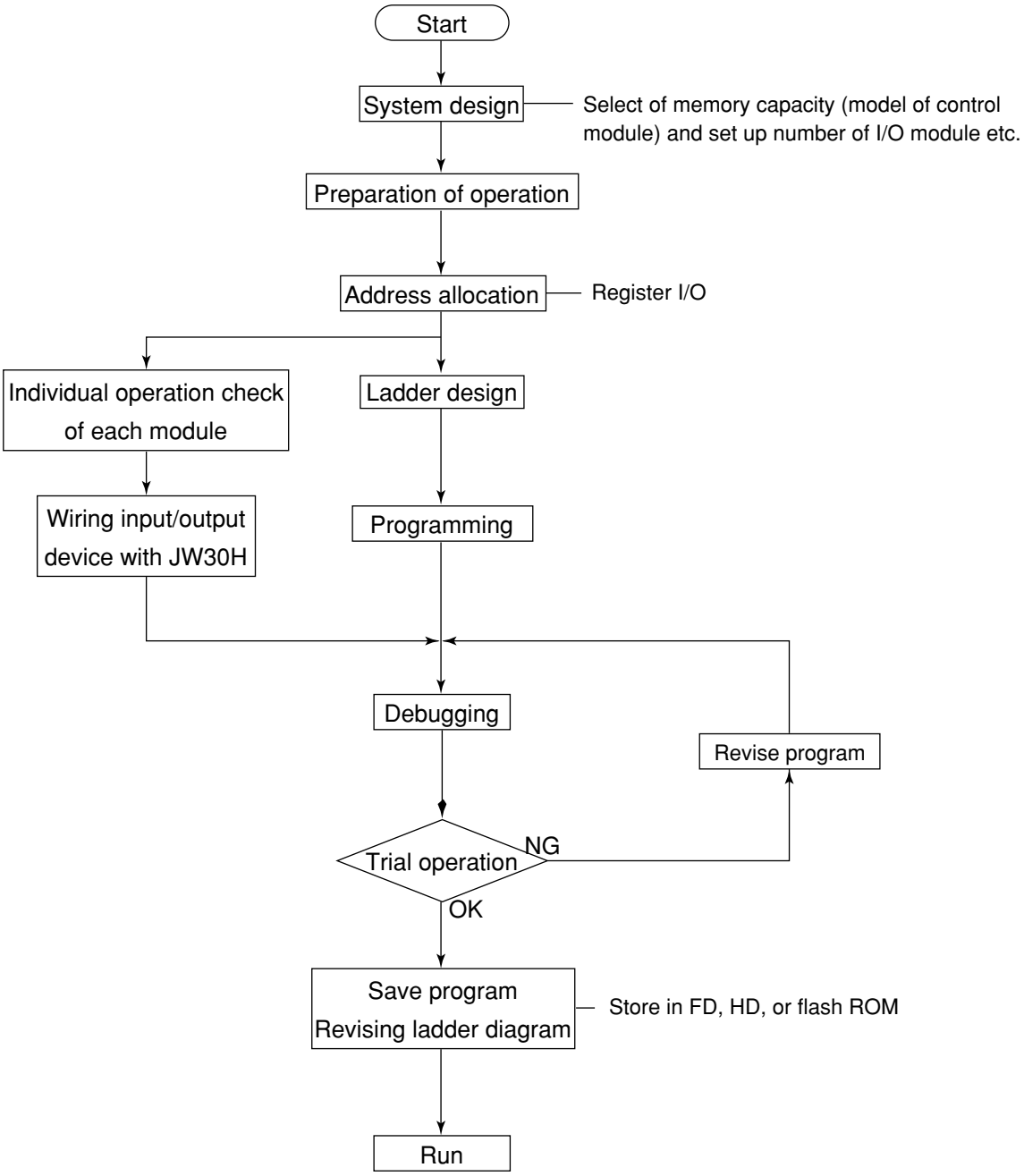


Up to 63 slave nodes can be connected to a single master module.

Items	Specifications			
Number of I/O points	4096 points input and output to data tables (512 bytes)			
Communication speed	Selectable: 125 k bits/s, 250 k bits/s, or 500 k bits/s.			
Communication distance (maximum)	**Communication speed**	**125 k bits/s**	**250 k bits/s**	**500 k bits/s**
	Trunk length using a thick cable	500 m	250 m	100 m
	Trunk length using a thin cable	100 m	100 m	100 m
	Maximum branch line length	6 m	6 m	6 m
	Total length of branch lines	156 m	78 m	39 m
Communication function	Polling I/O function, Explicit message function			
Communication cable type	Proprietary cable (Five conductors: 2 signal wires, 2 power source wires, 1 shield) - Thick cable: For trunks - Thin cable: For trunks or branch lines			
Data table assignment	In the scan list editing mode you can select "allocation in address order," "even number allocation," or "allocation in the order in which vacant nodes are occupied" as the method for I/O data mapping			

3-3 System design procedure

The system design procedure is virtually as the same as those of the other conventional relay controllers. The following is an example of the system design procedure of the JW30H.



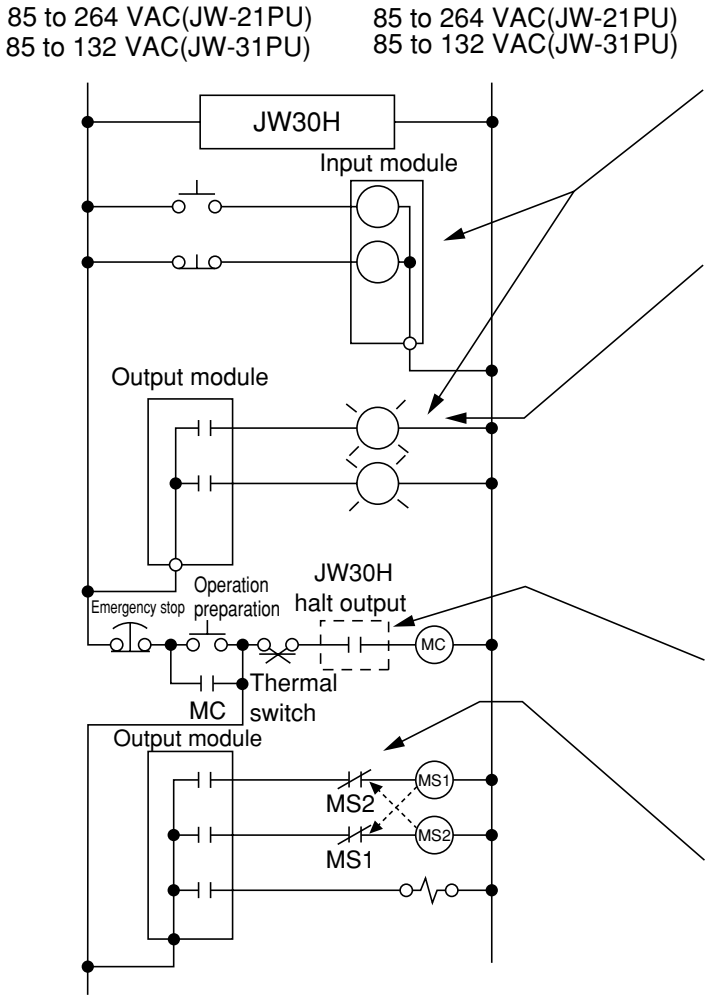
3-4 Cautions on system design

A principle difference between a programmable controller (PC) and a conventional relay circuit is that a PC controls each operation cyclically (in series), whereas relay circuit controls it in parallel. Therefore, relay circuits limit the effect of an abnormal operation to a block.
However, a PC allows abnormal operations of the whole system when an abnormal condition occur. In order to create a fail-safe system, we recommend preparing independent external protective circuits for following functions, which may cause a breakdown of machine or injury to workers:

- Emergency stop circuit,
- Protection circuit,
- Operating circuit of high voltage device.

Also, be aware of the operation response time, as a PC operates using cyclic processing.
To prevent mis-operation due to output signal of the output module soon after switching on power to the JW30H, connect in series the halt output for the JW30H in the following operation stand-by circuit.

(1) In case of using AC power supply



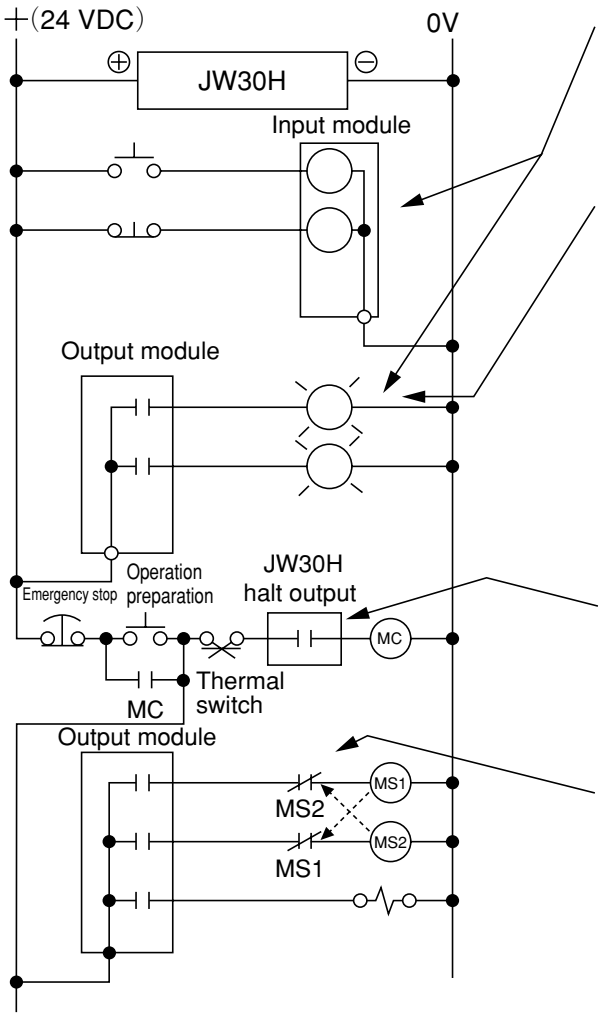
- Connecting the input module and output module for lighting lamps in front of emergency stop circuit makes it possible to grasp the stop condition of devices.

- When the JW30H stops its operation, all the output module indicate ON/OFF condition just before stopping.
  Note: When setting an output holding address in the system memory, all the output after the setting address is retained and you can reset the previously set address.
  (only available when power is supplied to the JW30H.)

- Halt output
  JW-21PU Relay output: 100/200 VAC, 30 VDC, 1A
  JW-31PU Relay output: 100 VAC, 30 VDC, 1A

- Interlock circuit
  Prepare external interlock circuit to prevent reverse operation, damage of machines and injury of workers.
  Note: When DC output module is used as a output module, use AC relay and install its contact in the emergency stop circuit.

(2) In case of using DC power supply

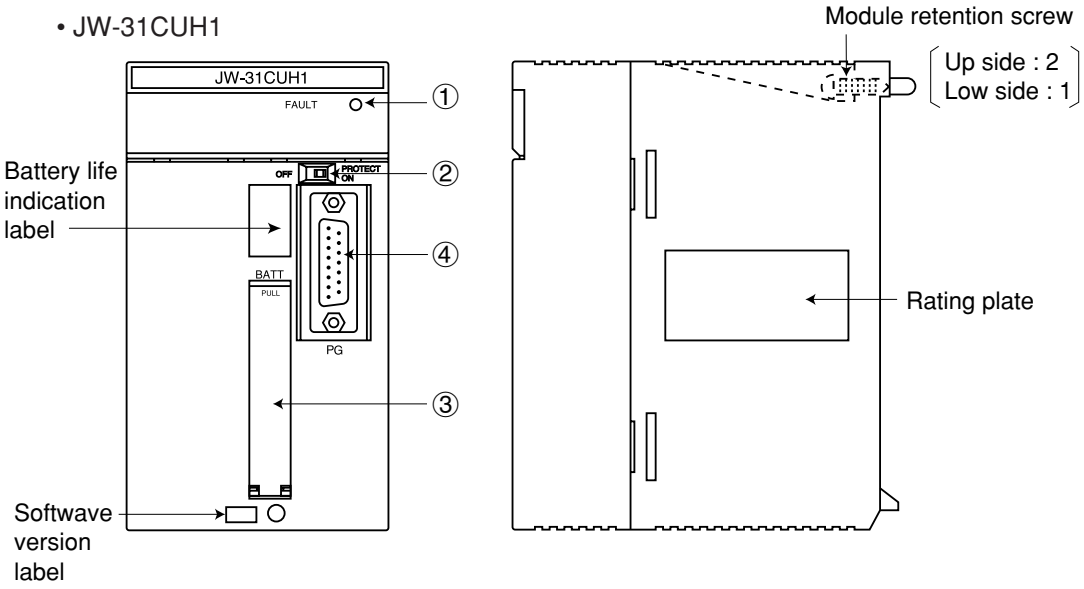


- Connecting an input module and output module for lighting lamps in front of emergency stop circuit makes it possible to grasp the stop condition of devices.
- When the JW30H stops its operation, all the output module indicate ON/OFF condition just before stopping.
  Note: When setting an output holding address in the system memory, all the output after the setting address is retained and you can reset the previously set adress.
  (only available when power is supplied to the JW30H.)
- Halt output (relay output 100/200 VAC, 30 VDC, 1A)
- Interlock circuit
  Prepare external interlock circuit to prevent reverse operation, damage to machines and injury of workers.

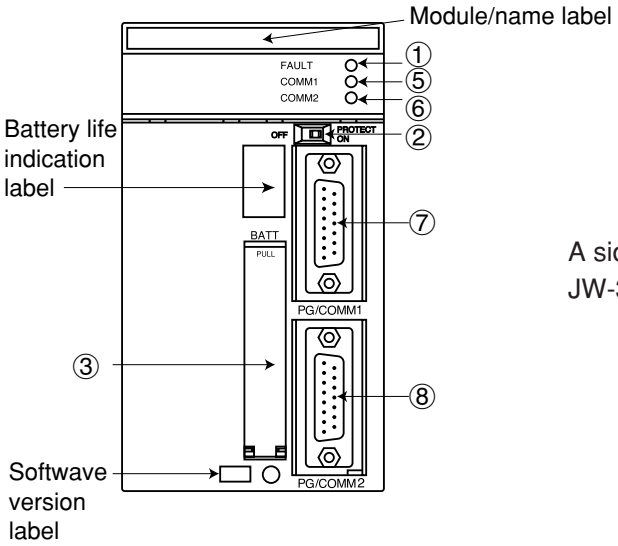
Chapter 4. Name and function of each part

4-1 Control module (JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3)

• JW-31CUH1



• JW-32CUH1/33CUH1/33CUH2/33CUH3

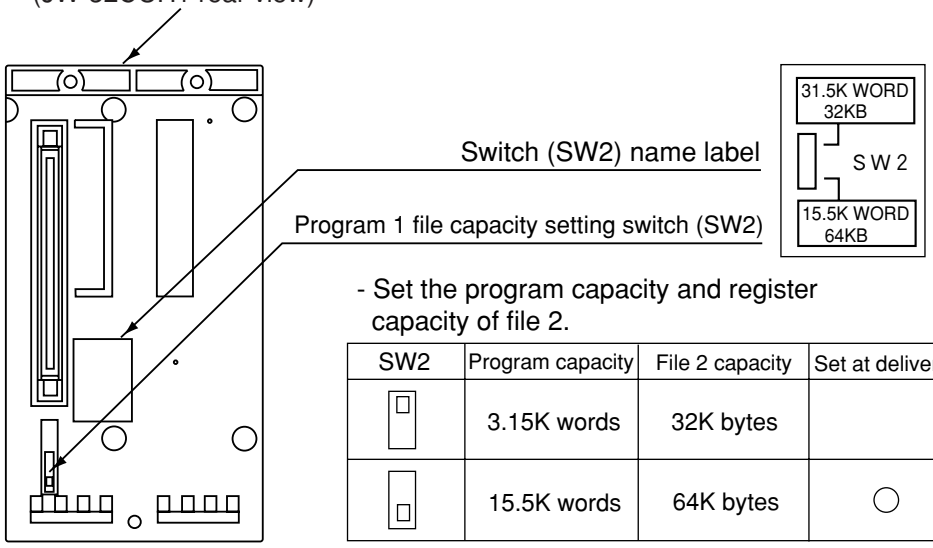


A side view of JW-32CUH1/JW-33CUH1/JW-33CUH2/JW-33CUH3 is same as JW-31CUH1.

	Name	Function	Model name
①	FAULT lamp (red)	Lights when detecting errors by self-diagnosis. PC stops its operations. (However, it operates even when battery is error.)	JW-31CUH1 JW-32CUH1 JW-33CUH1 JW-33CUH2 JW-33CUH3
②	PROTECT switch	Set prohibit (ON), enable (OFF) about writing to program memory and system memory.	
③	Battery cover	A battery module for memory backup is provided inside; opened and closed when replacing battery. (For exchange method, see page 9·3.)	
④	PG port (with cover)	Connector in order to connecting with support tool.	JW-31CUH1
⑤	COMM1 lamp	Lights when communicating with personal computer or the like, by using PG/COMM1 port. Lights up in monitoring state by connecting support tool.	JW-32CUH1 JW-33CUH1 JW-33CUH2 JW-33CUH3
⑥	COMM2 lamp	Lights when communicating with personal computer or the like, by using PG/COMM2 port. Lights up in monitoring state by connecting support tool.	
⑦	PG/COMM1 port (with cover)	A connector for connecting with support tool. A connector for connecting with device having Serial I/O port such as personal computer.	
⑧	PG/COMM2 port (with cover)	A connector for connecting with device having Serial I/O port such as personal computer. (Also possible to connect with support tool.)	

JW-32CUH1 has a switch in rear face of the module. (See the below.)

(JW-32CUH1 rear view)



- Set the program capacity and register capacity of file 2.

SW2	Program capacity	File 2 capacity	Set at delivery
	3.15K words	32K bytes	
	15.5K words	64K bytes	○

Note: Changing settings of the SW2 will erase program contents that have been set before the change, as well as a part of file 2 data. We recommend that you back-up programs and data by using a support tool, such as the JW-100SP, as you may need to use the same data after the change. After setting changes of the SW2 are completed, be sure to initialize all memory using a support tool such as the JW-14PG.

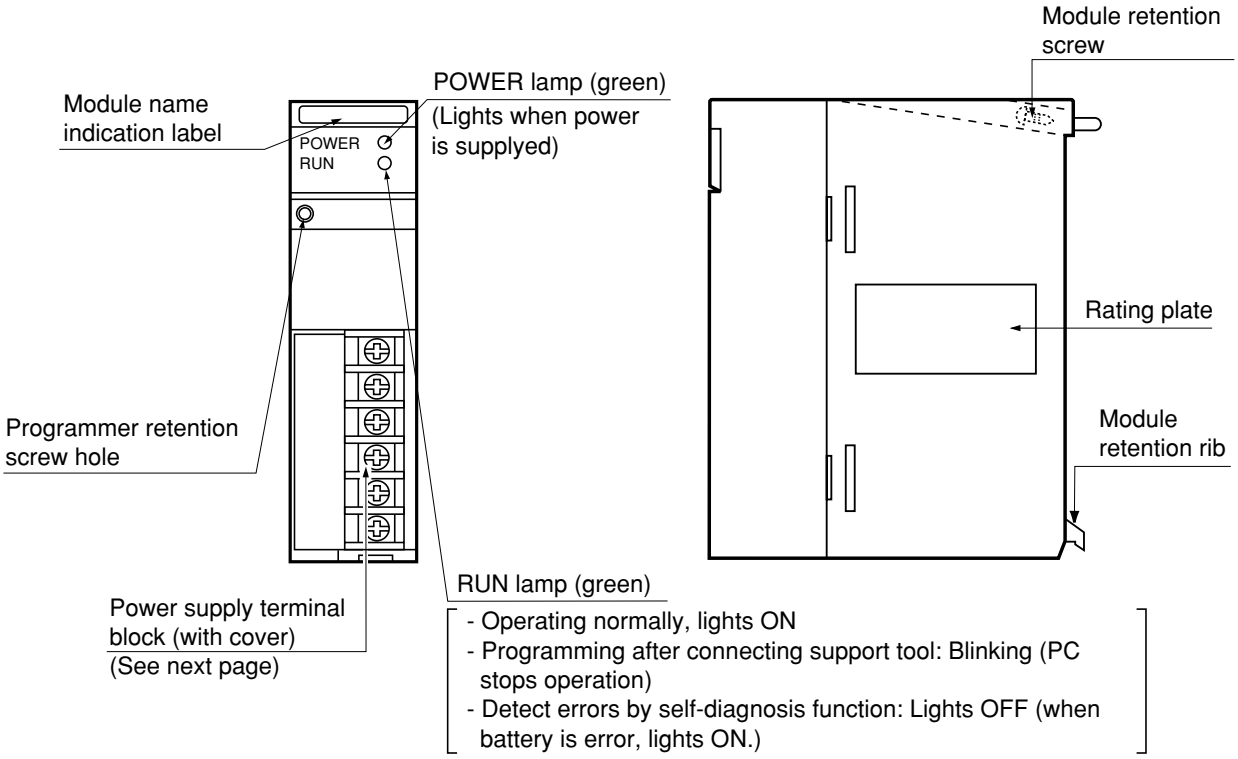
4-2 Power supply module (JW-21PU/22PU/31PU/33PU)

Four models : JW-21PU, JW-22PU, JW-31PU, and JW-33PU are available as power module.

Model name	Specification	Approved UL/CSA	Approved CE
JW-21PU	85 to 264 VAC. Power capacity: 5 VDC 3.5 A		
JW-22PU	20.4 to 32 VAC. Power capacity: 5 VDC 3.5 A		
JW-31PU	85 to 132 VAC. Power capacity: 5 VDC 3.5 A	O	
JW-33PU	85 to 264 VAC. Power capacity: 5 VDC 4.5 A	O	O

- When a power supply module is installed on an expansion rack panel, and if a power is supplied to the power supply module on the basic rack panel without supplying power to the power supply module on the expansion rack panel, the system detects as “input/output error” (#160 = Error code 40) or “expansion power supply error” (#160 = Error code 43). Make sure to supply power also to the power supply module on the expansion rack panel.
- The power terminal block is equipped with a terminal block cover at delivery. Remove this cover when you wire. After connecting, make sure to put the cover to the original position.

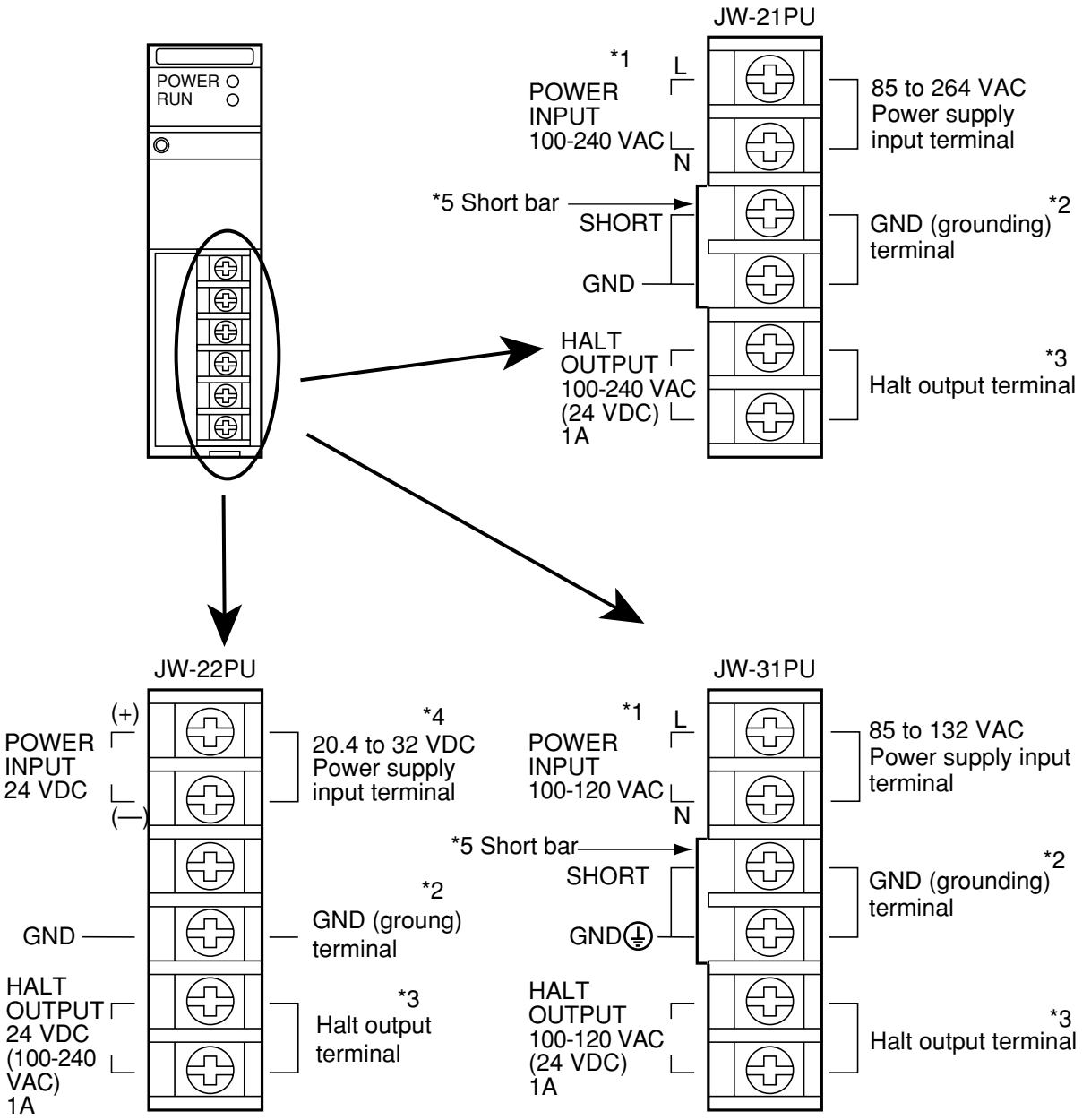
[1] JW-21PU/22PU/31PU


Module retention screw
POWER lamp (green)
(Lights when power is supplyed)
Module name indication label
POWER
RUN
Rating plate
Programmer retention screw hole
Module retention rib
RUN lamp (green)
Power supply terminal block (with cover)
(See next page)
- Operating normally, lights ON
- Programming after connecting support tool: Blinking (PC stops operation)
- Detect errors by self-diagnosis function: Lights OFF (when battery is error, lights ON.)

- The JW-21PU, 22PU, and 31PU are identical in shape.

[Power supply terminal block]

This is a terminal block for connecting extended line of power supply, GND, halt output and the like.



*1 Connect the power supply input of JW-21PU/31PU while paying attention to the L terminal (LIVE: non-grounded side) and N terminal (NEUTRAL: grounded side).

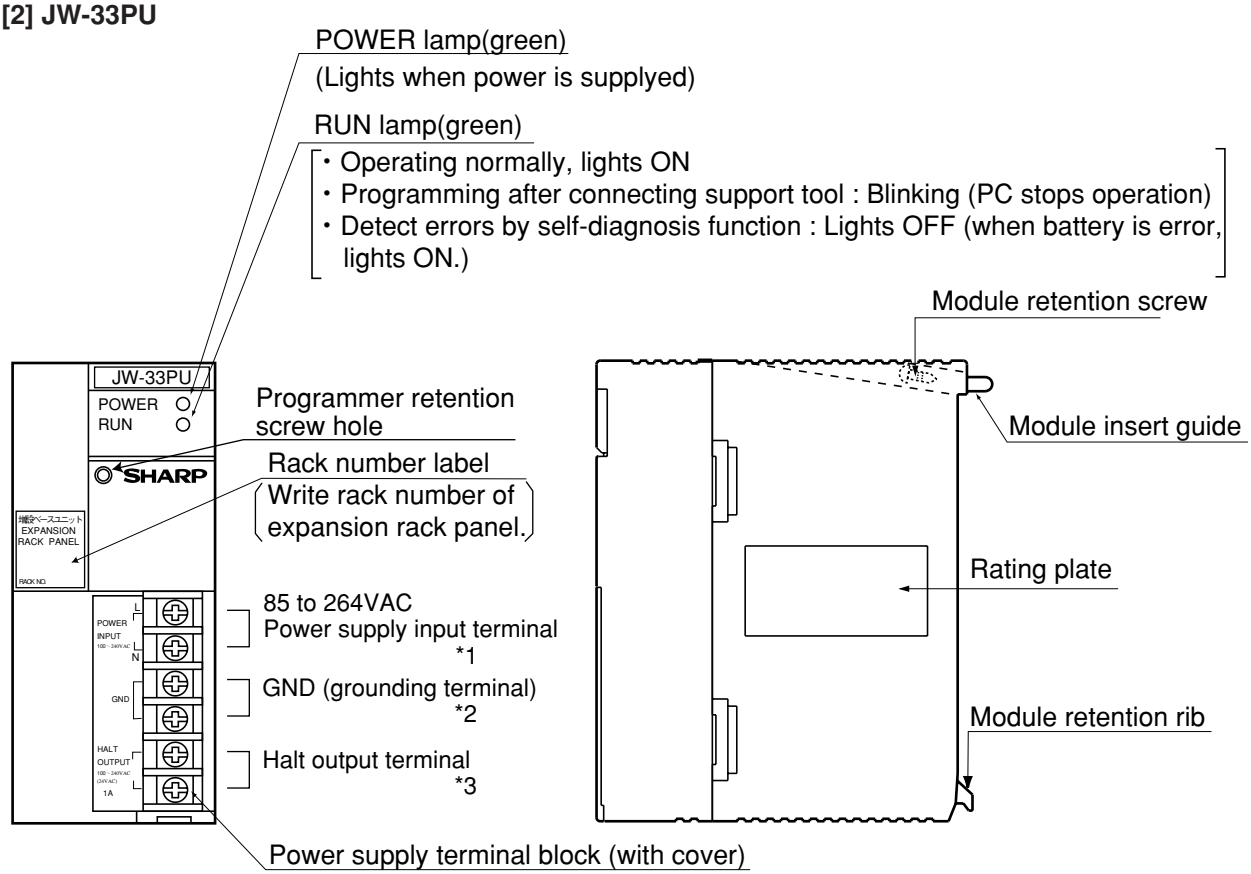
*2 To prevent electric shock and noise error, be sure to separately prepare class-3 grounding.

*3 Be sure to incorporate the line to the external emergency stop circuit.

*4 As for DC input power supply, use power source of 20.4 to 32 VDC (ripple rate 20% or less; however, ripple upper limit: 32 V or less, lower limit: 20.4 V or more).

*5 When testing insulation resistance or dielectric strength of the JW-21PU/31PU power supply modules, be sure to remove the short bar connecting between the SHORT terminal and the GND terminal. The power supply module has a serge absorber connected between the AC input line and the SHORT terminal, as well as a short bar between the SHORT terminal and the GND terminal at the time of shipment. If a test is carried out without removing the short bar, internal elements of the module may be damaged due to overcurrent.

[2] JW-33PU



*1: Connect the power supply input while paying attention to the terminal (LIVE: non-grounded side) and N terminal (NEUTRAL : grounded side).

*2: To prevent electric shock and noise, error, be sure to separately prepare class-3 grounding. Connect with internal between GND terminal.(Short bar having JW-21PU/31PU do not have in JW-33PU).

*3: Be sure to incorporate the line to the external emergency stop circuit.

4-3 Input/output module

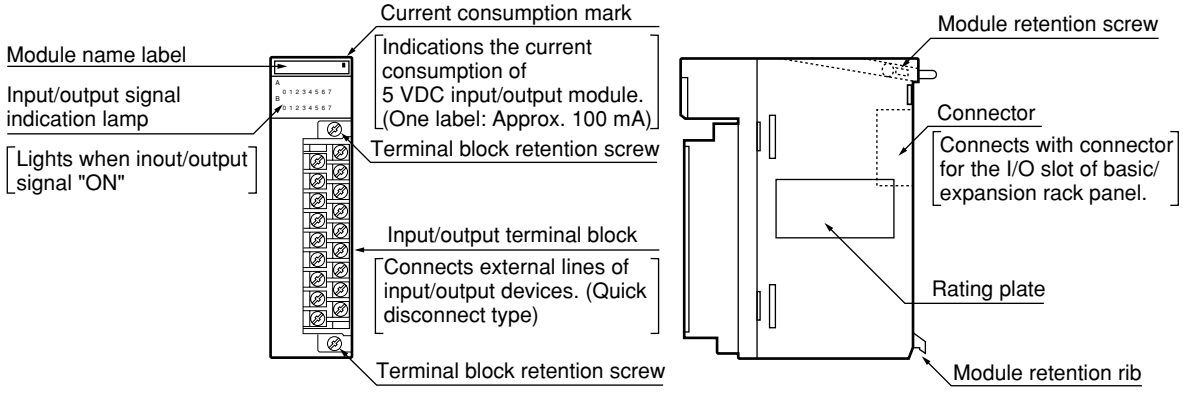
The following models are available in the input/output module.
The input/output module can be installed in any order in the I/O module slot of the basic/expansion rack panel.

■ Kinds of input/output module

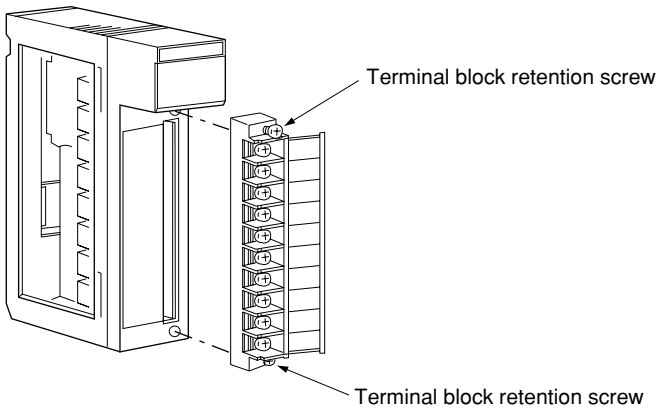
I/O module having 8, 16, and 32 points are available.
Special I/O module having 64 points are available.

	Model name	Points	Specifications	Applied CE markings
Input	JW-201N	8	100/120 VAC	
	JW-202N	8	12/24 VDC	
	JW-203N	8	200/240 VAC	
	JW-211NA	16	100/120 VAC	O
	JW-212NA	16	12/24 VDC	O
	JW-214NA	16	12/24 VDC (high speed type)	O
	JW-234N	32	12/24 VDC (high speed type, connector connection)	O
Output	JW-202S	8	5/12/24 VDC, 1A, transistor output (sink output)	
	JW-203S	8	100/200 VAC, 1A, triac output	
	JW-204S	8	250 VAC/30 VDC, 2A, relay output (separated common)	
	JW-212SA	16	5/12/24 VDC, 0.5A, transistor output (sink output)	O
	JW-213SA	16	100/200 VAC, 0.5A, triac output	O
	JW-214SA	16	250 VAC/30 VDC, 2A, relay output	O
	JW-232S	32	5/12/24 VDC, 0.1A, transistor output (sink output, connector connection)	O
I/O	JW-232M	12/24 VDC, input 16 points, transistor 16 points output, 0.1A (sink output, connector connection)		O
Special I/O	JW-264N	64	24 VDC (high speed type, connector connection)	O
	JW-262S	64	5/12/24 VDC, 0.1A transistor output (sink output, connector connection)	O

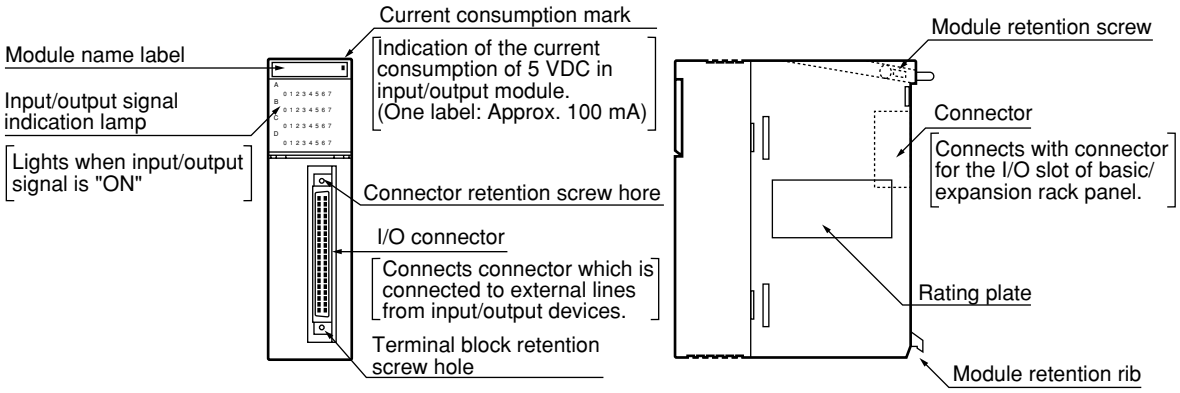
[1] 8/16 points module


Current consumption mark
Indications the current consumption of 5 VDC input/output module. (One label: Approx. 100 mA)
Module name label
Input/output signal indication lamp
Lights when inout/output signal "ON"
Terminal block retention screw
Input/output terminal block
Connects external lines of input/output devices. (Quick disconnect type)
Terminal block retention screw
Module retention screw
Connector
Connects with connector for the I/O slot of basic/ expansion rack panel.
Rating plate
Module retention rib

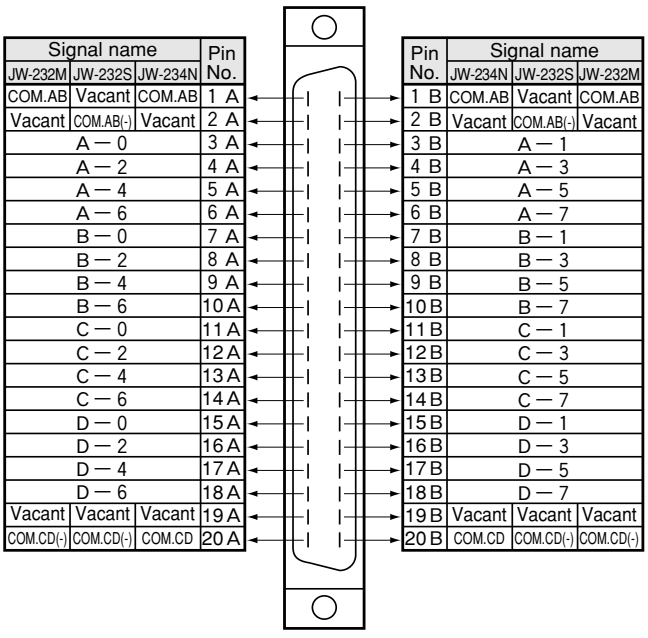
The terminal block connecting external lines in 8/16 points I/O module is quick-disconnect type. Loosen 2 mounting screws provided in upper and lower positions of the terminal block, then the terminal block can be detached. And a malfunctioning I/O module can be replaced without removing the external lines from the terminal block.



[2] 32 points module


Current consumption mark
Indication of the current consumption of 5 VDC in input/output module. (One label: Approx. 100 mA)
Module name label
Input/output signal indication lamp
Lights when input/output signal is "ON"
Connector retention screw hore
I/O connector
Connects connector which is connected to external lines from input/output devices.
Terminal block retention screw hole
Module retention screw
Connector
Connects with connector for the I/O slot of basic/ expansion rack panel.
Rating plate
Module retention rib

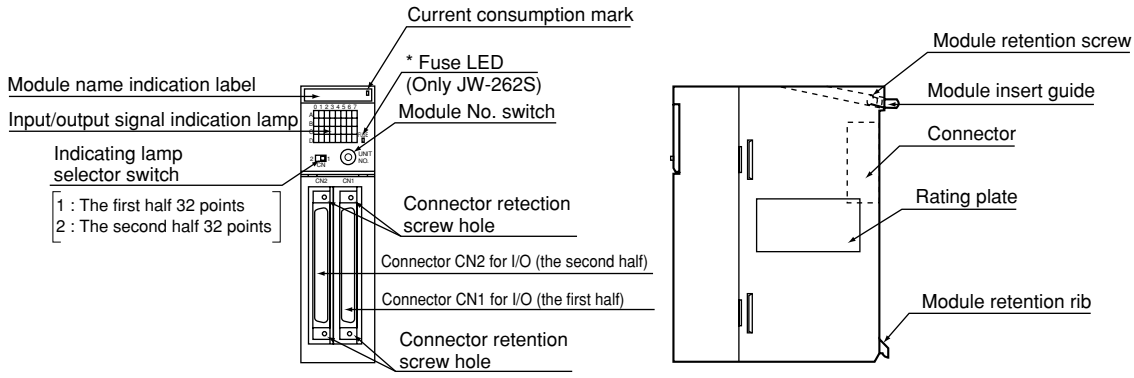
[Pin No. of I/O connector and signal name]



Signal name			Pin No.
JW-232M	JW-232S	JW-234N	
COM.AB	Vacant	COM.AB	1 A
Vacant	COM.AB(-)	Vacant	2 A
A — 0			3 A
A — 2			4 A
A — 4			5 A
A — 6			6 A
B — 0			7 A
B — 2			8 A
B — 4			9 A
B — 6			10 A
C — 0			11 A
C — 2			12 A
C — 4			13 A
C — 6			14 A
D — 0			15 A
D — 2			16 A
D — 4			17 A
D — 6			18 A
Vacant	Vacant	Vacant	19 A
COM.CD(-)	COM.CD(-)	COM.CD	20 A

Pin No.	Signal name		
	JW-234N	JW-232S	JW-232M
1 B	COM.AB	Vacant	COM.AB
2 B	Vacant	COM.AB(-)	Vacant
3 B	A — 1		
4 B	A — 3		
5 B	A — 5		
6 B	A — 7		
7 B	B — 1		
8 B	B — 3		
9 B	B — 5		
10 B	B — 7		
11 B	C — 1		
12 B	C — 3		
13 B	C — 5		
14 B	C — 7		
15 B	D — 1		
16 B	D — 3		
17 B	D — 5		
18 B	D — 7		
19 B	Vacant	Vacant	Vacant
20 B	COM.CD	COM.CD(-)	COM.CD(-)

[3] 64 points module



* The fuse LED (JW-262S only) lights up (red) when the blown fuse or when the load power supply is turned OFF. When the connector CN1 or CN2 is not used (not connected), power supply is not applied to line (+) and COM (–), and hence the fuse LED lights (red). (It has, however, no effect on the output operation of the operating connector side.)
In this case, by connecting the furnished connector to an idle connector and applying power supply between line (+) and COM (–), it prevents from lighting of fuse LED due to idle connector.

[Pin No. of connector CN1, CN2 and signal name]

CN1 (The first half 32 points)

CN1

Signal name JW-264N	Signal name JW-262S	Pin No.	Pin No.	Signal name JW-264N	Signal name JW-262S
COM.1	Power supply 1 (+)	1 A	1 B	COM.1	Power supply 1 (+)
Vacant	COM.1 (-)	2 A	2 B	Vacant	COM.1 (-)
A — 0		3 A	3 B	A — 1	
A — 2		4 A	4 B	A — 3	
A — 4		5 A	5 B	A — 5	
A — 6		6 A	6 B	A — 7	
B — 0		7 A	7 B	B — 1	
B — 2		8 A	8 B	B — 3	
B — 4		9 A	9 B	B — 5	
B — 6		10 A	10 B	B — 7	
C — 0		11 A	11 B	C — 1	
C — 2		12 A	12 B	C — 3	
C — 4		13 A	13 B	C — 5	
C — 6		14 A	14 B	C — 7	
D — 0		15 A	15 B	D — 1	
D — 2		16 A	16 B	D — 3	
D — 4		17 A	17 B	D — 5	
D — 6		18 A	18 B	D — 7	
Vacant	COM.1 (-)	19 A	19 B	Vacant	COM.1 (-)
COM.1	Power supply 1 (+)	20 A	20 B	COM.1	Power supply 1 (+)

- Pin number 1A and 20A, and 1B and 20B of JW-264N are respectively connected inside.

- Pin number 1A and 19A, 2A and 20B, 1B and 19B, and 2B and 20B of JW-262S are respectively connected insides.

CN2 (The second half 32 points)

CN2

Signal name JW-264N	Signal name JW-262S	Pin No.	Pin No.	Signal name JW-264N	Signal name JW-262S
COM.2	Power supply 2 (+)	1 A	1 B	COM.2	Power supply 2 (+)
Vacant	COM.2 (-)	2 A	2 B	Vacant	COM.2 (-)
A — 0		3 A	3 B	A — 1	
A — 2		4 A	4 B	A — 3	
A — 4		5 A	5 B	A — 5	
A — 6		6 A	6 B	A — 7	
B — 0		7 A	7 B	B — 1	
B — 2		8 A	8 B	B — 3	
B — 4		9 A	9 B	B — 5	
B — 6		10 A	10 B	B — 7	
C — 0		11 A	11 B	C — 1	
C — 2		12 A	12 B	C — 3	
C — 4		13 A	13 B	C — 5	
C — 6		14 A	14 B	C — 7	
D — 0		15 A	15 B	D — 1	
D — 2		16 A	16 B	D — 3	
D — 4		17 A	17 B	D — 5	
D — 6		18 A	18 B	D — 7	
Vacant	COM.2 (-)	19 A	19 B	Vacant	COM.2 (-)
COM.2	Power supply 2 (+)	20 A	20 B	COM.2	Power supply 2 (+)

- Pin number 1A and 20A, and 1B and 20B of JW-264N are respectively connected inside.

- Pin number 1A and 19A, 2A and 20A, 1B and 19B, and 2B and 20B of JW-262S are respectively connected insides.

4-4 Basic/expansion rack panel

[1] Basic rack panel

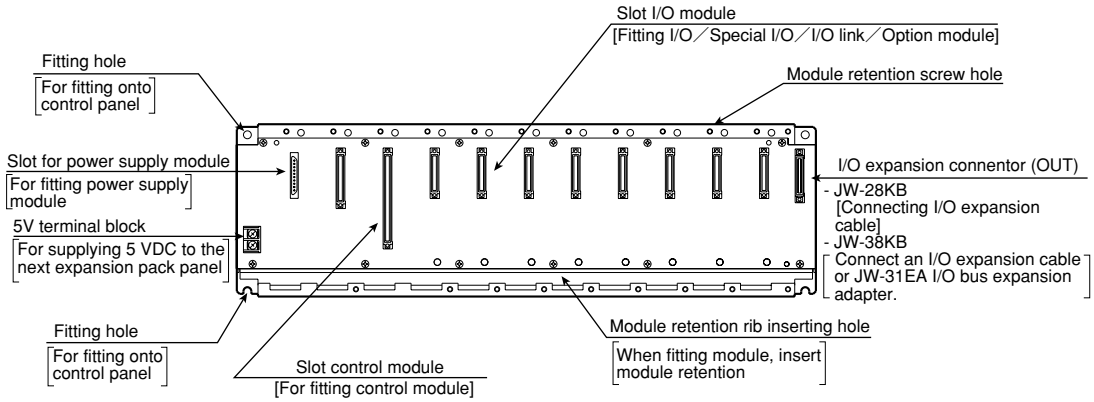
Basic rack panel has slots for power supply module, control module, and I/O module. In the slot for I/O module, I/O, special I/O, I/O link, and option module can be connected in mixture.

The basic rack panel has 6 different models, which are classified based on the number of slots to be used for an I/O module, and whether or not it has A JW-31EA, an I/O bus expansion adapter.

Model name	Number of slot			I/O bus expansion adapter (Installation of JW-31EA)
	For power supply module	For control module	For I/O module	
JW-24KB	1	1	4	Unavailable
JW-26KB	1	1	6	
JW-28KB	1	1	8	
JW-34KB	1	1	4	Available
JW-36KB	1	1	6	
JW-38KB	1	1	8	

The name of each part and its function give and account of the following JW-28KB, JW-38KB. Different from other basic rack panel only in the number of slots for I/O module.

• JW-28KB, JW-38KB


Slot I/O module
[Fitting I/O／Special I/O／I/O link／Option module]
Fitting hole
[For fitting onto control panel]
Module retention screw hole
Slot for power supply module
[For fitting power supply module]
I/O expansion connentor (OUT)
- JW-28KB
[Connecting I/O expansion cable]
- JW-38KB
[Connect an I/O expansion cable or JW-31EA I/O bus expansion adapter.]
5V terminal block
[For supplying 5 VDC to the next expansion pack panel]
Fitting hole
[For fitting onto control panel]
Module retention rib inserting hole
[When fitting module, insert module retention]
Slot control module
[For fitting control module]

Note

- Put a connector cover on unused slots to prevent dust from entering.
  At the delivery, they are covered by connector covers to keep out dust.

[2] Expansion rack panel

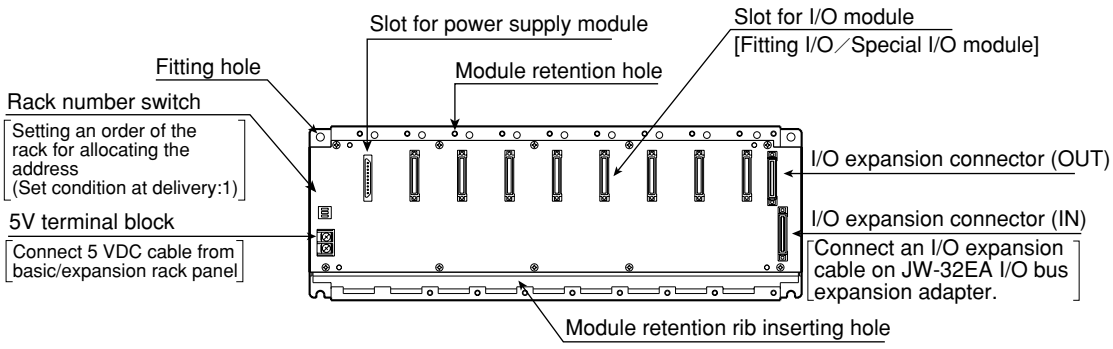
Expansion rack panel has slots for power supply module and I/O module. In the slot for I/O module, I/O and special I/O module can be connected in mixture. The I/O link and option module can not be installed on it.

The expansion rack panel has 3 different models, which are classified based on the number of slots to be used for an I/O module.

Model name	No. of slot		I/O bus expansion adapter (Installation of JW-32EA)
	For power supply module	For I/O module	
JW-34ZB	1	4	Available
JW-36ZB	1	6	
JW-38ZB	1	8	

The name of each part and its function give on account of the following JW-38ZB. Different from other expansion rack panel only in the number of slots for I/O module.

• JW-38ZB


Slot for power supply module
Slot for I/O module
[Fitting I/O／Special I/O module]
Fitting hole
Module retention hole
Rack number switch
Setting an order of the rack for allocating the address (Set condition at delivery:1)
I/O expansion connector (OUT)
5V terminal block
I/O expansion connector (IN)
Connect 5 VDC cable from basic/expansion rack panel
Connect an I/O expansion cable on JW-32EA I/O bus expansion adapter.
Module retention rib inserting hole

Note

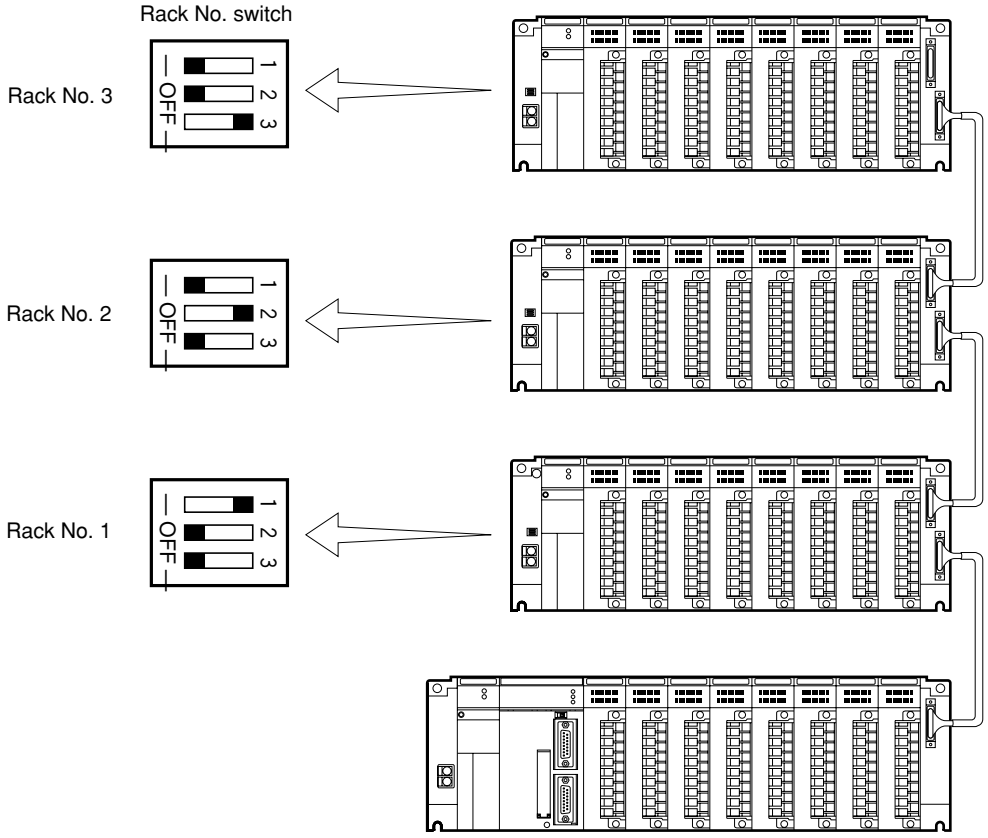
- Put a connector cover on unused slots to prevent dust from entering.
  At the delivery, they are covered by connector covers to keep out dust.

■ **Rack No. of the expansion rack panel**

(1) In case of not using I/O bus expansion adapter

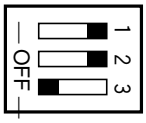
System can be configured with up to 4 racks, and each rack ID number will be specified by the settings of the rack number switch on the expansion rack panel.

The basic rack panel is fixed to rack No. 0.

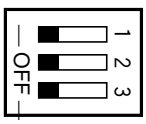


It is an error when the rack number switch is set as follows, and the JW30H does not operate.

1. There are plural ON settings.



2. All setting of the rack no. is OFF.

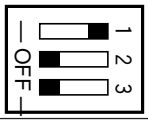
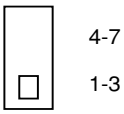
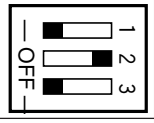
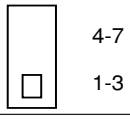
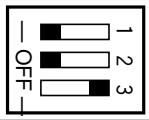
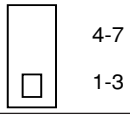
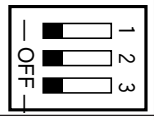
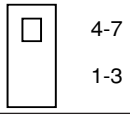
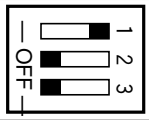
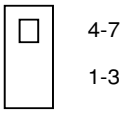
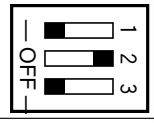
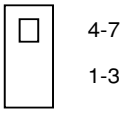
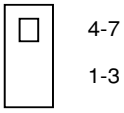


3. Rack numbers are duplicate with other expansion rack panel.
   All of the states 1 to 3 result in table registration error (70) or table verify error (60), and the error code is stored in the system memory #160.
   The shipping setting of rack number switch is "1" (switch 1 is ON).

(2) In case of using I/O bus expansion adapter

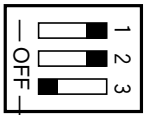
System can be configured with max. 8 racks when an expansion rack panel, JW-34ZB/36ZB/38ZB, is connected with an I/O bus expansion adapter, JW-32EA. Each rack panel ID number will be defined by combination of settings for the rack number switches on the expansion rack panel and the JW-32EA.

The basic rack panel is fixed to rack No. 0.

Rack No.	Rack No. switch of expansion rack panel	Rack No. switch of I/O bus expansion adapter (JW-32EA)
1	ON for only No. 1 	1-3 side 
2	ON for only No. 2 	1-3 side 
3	ON for only No. 3 	1-3 side 
4	OFF for all 	4-7 side 
5	ON for only No. 1 	4-7 side 
6	ON for only No. 2 	4-7 side 
7	ON for only No. 3	4-7 side 

It is an error when the rack number switch is set as follows, and the JW30H does not operate.

1. There are plural ON settings.

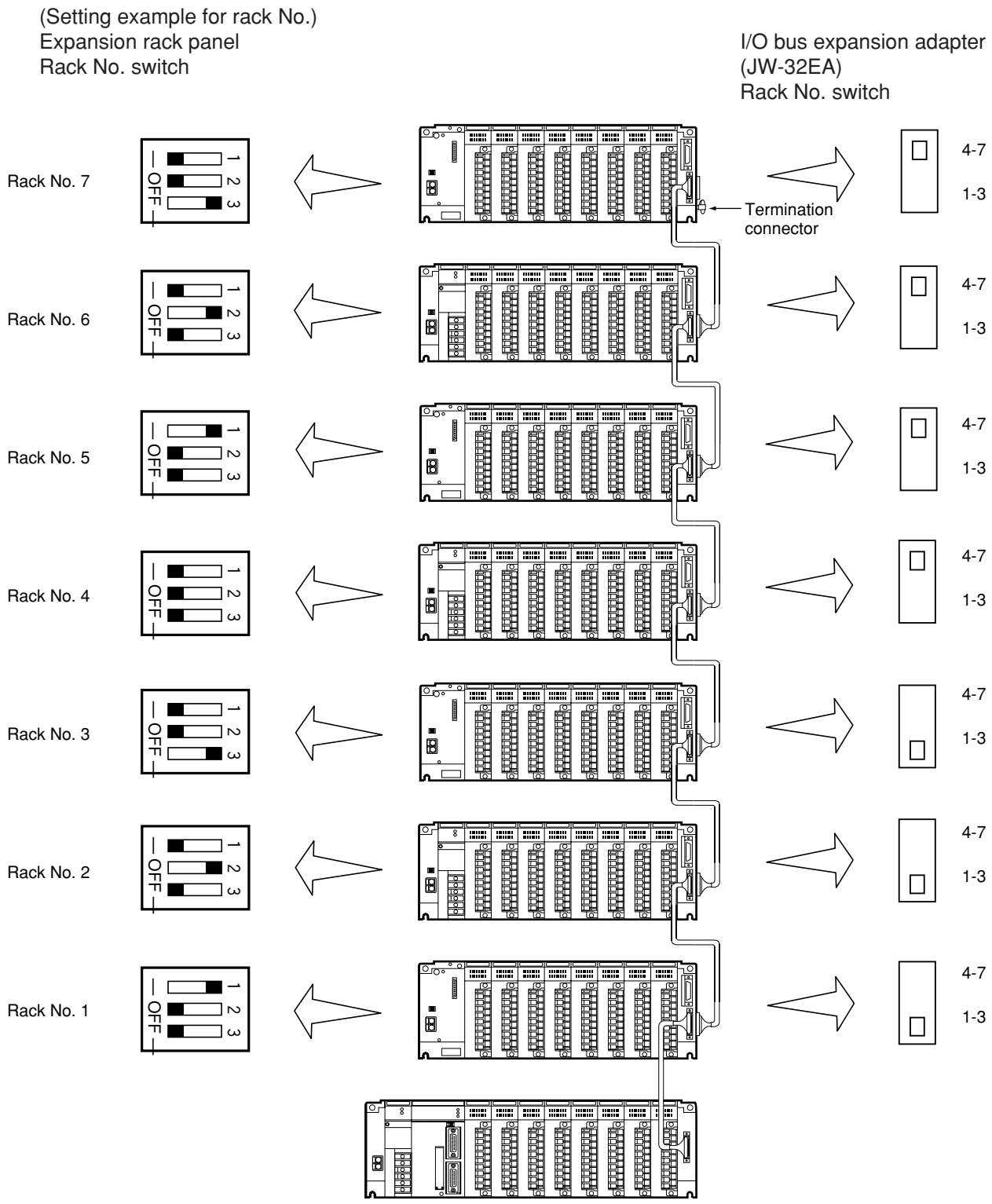


2. Rack numbers are duplicate with other expansion rack panel.

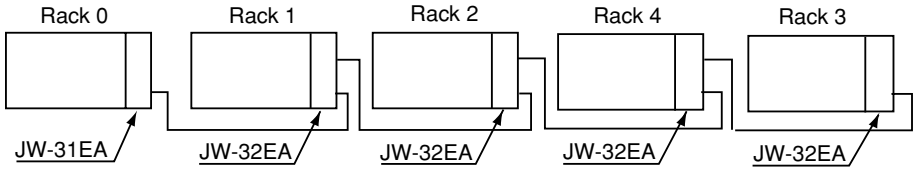
Both states 1 and 2 result in table registration error (70) or table verify error (60), and the error code is stored in the system memory #160.

The shipping setting of rack number switch is "1" (switch 1 is ON), and that of I/O bus expansion adapter is "1 to 3" side.

For I/O bus expansion adapter, see page 4-13 to 15.



Note: Rack numbers are not necessarily set in order of added timings. For example, they can be set as shown below.



[3] Important points when using basic /expansion rack panels

System specifications can be defined by the combination of basic rack panel and expansion rack panel as shown in the table below.

■ **Combinations of basic and expansion rack panels**

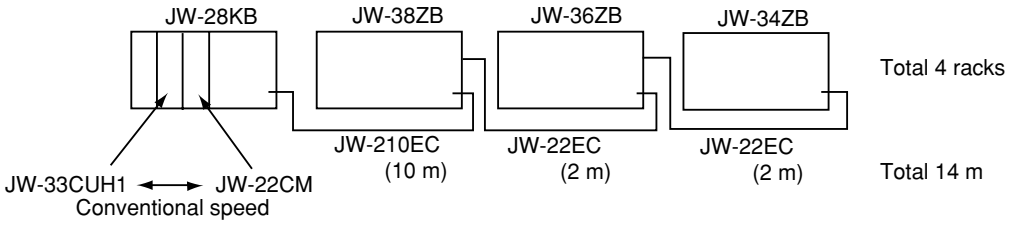
Expansion rack panel \ Basic rack panel	JW-24KB/26KB/28KB	JW-34KB/36KB/38KB (Without JW-31EA)	JW-34KB/36KB/38KB (With JW-31EA)
None	A	B	Unable to use in combination
JW-34ZB/36ZB/38ZB (Without JW-32EA)	C	D	Unable to use in combination
JW-34ZB/36ZB/38ZB (With JW-32EA)	Unable to use in combination	Unable to use in combination	E

■ **System specifications**

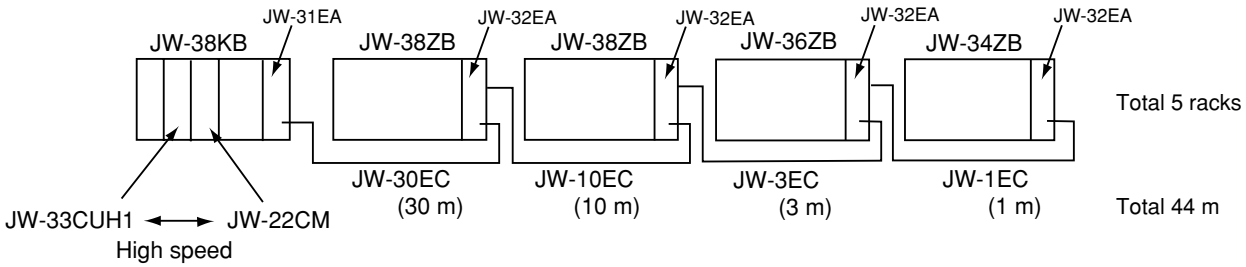
Specifications	Combinations of basic/expansion rack panels (as above)			
	A	B	C, D	E
① Max. number of racks	1	1	4	8
② Total expansion length	-	-	14 m	50 m
③ Option bus speed (Note)	Conventional speed	High speed	Conventional speed	High speed
④ I/O expansion cable	-	-	JW-203EC (30 cm) JW-207EC (70 cm) JW-22EC (2 m) JW-25EC (5 m) JW-210EC (10 m)	JW-05EC (50 cm) JW-1EC (1 m) JW-3EC (3 m) JW-10EC (10 m) JW-20EC (20 m) JW-30EC (30 m) JW-50EC (50 m)

Note: Option bus speed is data exchange speed between an option module and a control module, and the “high speed” is 5 times faster than the “conventional speed.” The conventional speed is the data exchange speed between a conventional control module, including JW-31CUH/32CUH/33CUH, and an option module.

(An example of combination C above)



(An example of combination E above)

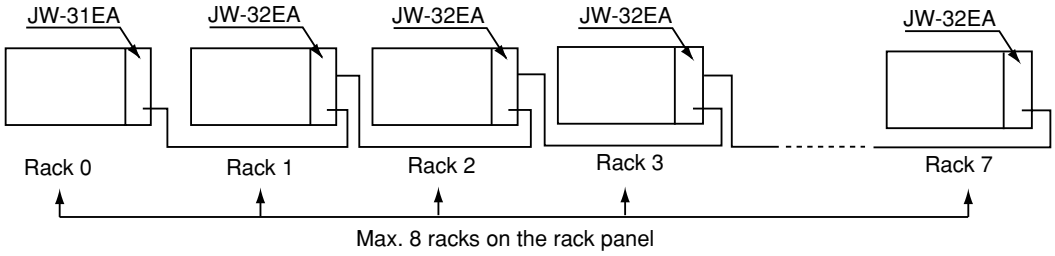


4-5 I/O bus expansion adapter

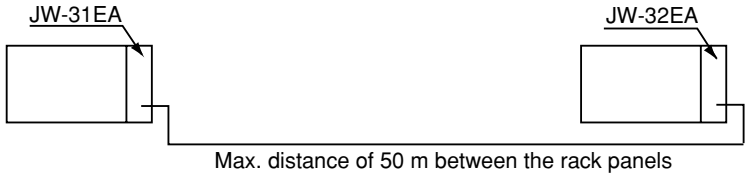
I/O bus expansion adapter for the JW30H has two available models, the JW-31EA and the JW-32EA, that are used to link signals sent from each rack panel. The JW-31EA is installed in the basic rack panel JW-34KB/36KB/38KB, while the JW-32EA is installed in the expansion rack panel JW-34ZB/36ZB/38ZB. The I/O expansion cable, JW-05EC/1EC/3EC/10EC/20EC/30EC/50EC, is used to connect rack panels. (See page 6-15 for connection method of I/O expansion cable).

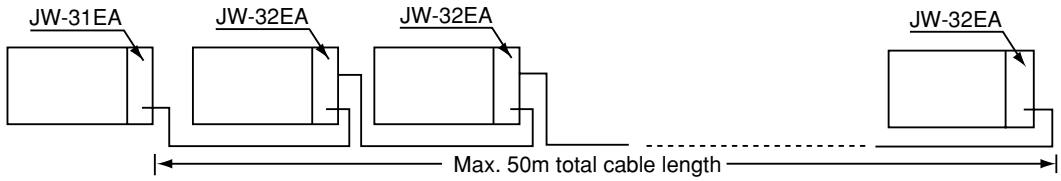
I/O bus expansion adapter is used for the following cases:

1) In the case of using min. 5 racks (max. 8) on the rack panel

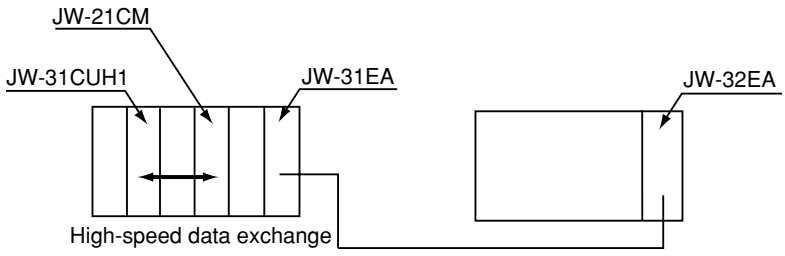


2) In the case of keeping a min. distance of 11 m (max. 50 m) between rack panels, or keeping a min. distance of 15 m (max. 50 m) between the basic rack panel and the last expansion rack panel:

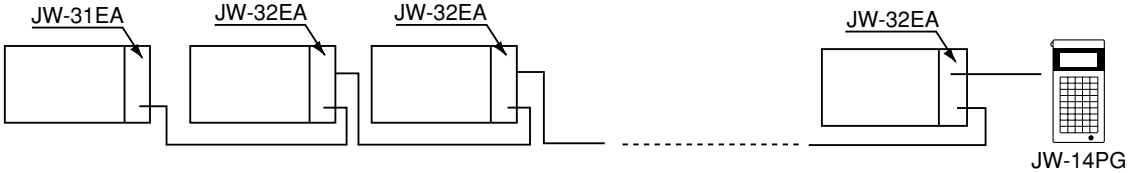




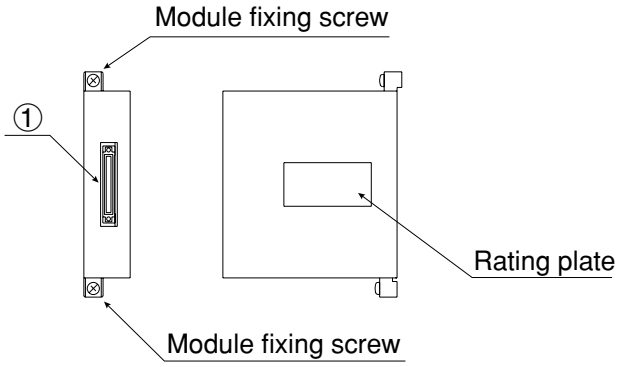
3) In the case of operating a high-speed data exchange (5 times faster than without using I/O bus expansion adapter) between an option module, such as JW-21CM and JW-22CM, and a control module on a system that needs an expansion rack panel:



4) In the case of creating, changing, or monitoring a program on the expansion rack panel side using a support tool (JW-14PG, JW-100SP etc.).



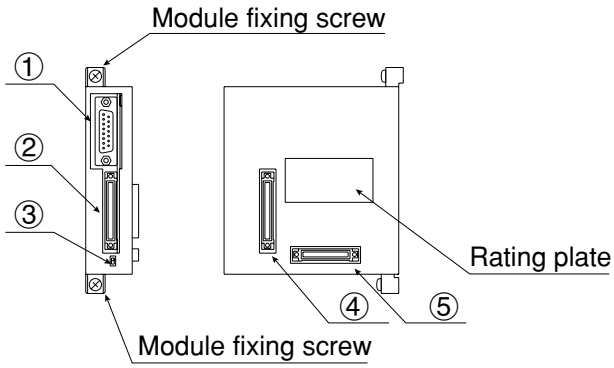
(1) JW-31EA



① **I/O expansion connector**

Connect between the I/O expansion connectors (IN) of JW-32EA using I/O expansion cables.

(2) JW-32EA



① **Connector for support tool connection**

Connecting a support tool, such as a hand-held programmer, enables creating/changing/monitoring program on the expansion rack panel that is max. 50 meters away.

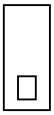
② **I/O expansion connector (IN)**

Connect this connector and an I/O expansion connector (OUT) on the JW-31EAs or the JW-32EAs (a front rack) using an I/O expansion cable.

③ **Rack No. switch**

Set rack numbers on the mounted rack panel.

Rack No.



4-7: When setting racks 4 to 7

1-3: When setting racks 1 to 3 (setting at delivery)

Rack ID numbers are determined by combined setting of this rack number switches and ones on the expansion rack panel, JW-34ZB/36ZB/38ZB. See page 4-12 for details.

④ **I/O expansion connector (OUT)**

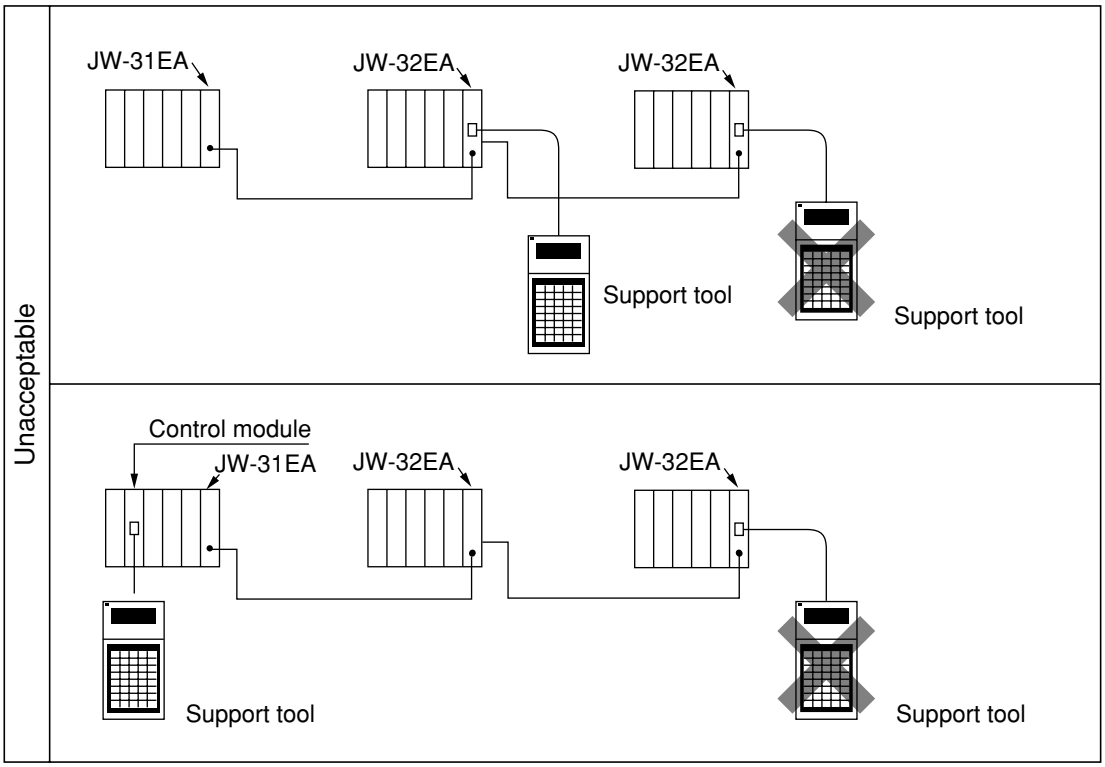
Connect this connector and an I/O expansion connector (IN) on the JW-32EA (the next rack) using an I/O expansion cable.

⑤ **Termination connector insert**

Insert a termination connector when a mounted expansion rack panel is at the end of the system. One each termination connector is supplied with each JW-31EA.

Notes

- Only one support tool can be connected with a JW-32EA. Also, do not connect another support tool to the JW-32EA when a support tool is already connected to the control module. Or it may cause a malfunction.



- The converntional models JW-31CUH/32CUH/33CHU of the control modules can't be used the JW-31EA/32EA I/O bus expansion adapter.

Chapter 5. Installation

5-1 Precautions in installation

The JW30H is not designed for dust and water proof construction.
Therefore, install JW30H in an enclosed panel.
Avoid keeping the JW30H in the following conditions:

1. Ambient temperature extremes outside the range of 0 to 55 °C
2. The relative humidity exceeding the range of 35 to 90%
3. Sudden temperature changes which may cause condensation.
4. Corrosive and flammable gases.
5. Water, oil and organic solvents dripping positions.
6. Dusts, iron and salty conditions.
7. A box in which high voltage device is installed.
8. Strong vibration and shock may usually occur.

Install on a good conductivity metal plated panel instead of painted one for easy grounding and better noise tolerance.
Use zinc plated retention screws of M5 for installing JW30H.

Calculation the avarage comsumption electric power (heating value) of JW30H.
Determine the average power consumption of the entire machine in the following formula, and calculate the temperature rise in the panel.

1) Power supply module.
   $Wpw = \frac{3}{7} \times (I_{5V} \times 5)$ (W)
   I_{5V}: Current comsumption of 5 VDC circuit of respective module.
2) Tatal comsumption electric power of respective module. (5 VDC)
   $W_{5V} = I_{5V} \times 5$ (W)
3) Average comsumption electric power of total 24 VDC power supply of output module. (Power consumption for simultaneous ON points)
   $W_{24V} = I_{24V} \times 24$ (W)
4) Average power consumption by output module drop voltage of output module. (Power consumption for simultaneous ON points)
   Wour = Iour × Vdrop × No. of output points × Simulataneous ON rate (W)
   Iour: Output current (current of use) (A)
   Vdrop: Drop voltage of respective output module. (V)
5) Input module average power consumption of input module. (Power consumption for simultaneous ON points)
   - In case of DC input
     $W_{IN} = I_{IN} \times E \times$ No. of input points × Simulataneous ON rate (W)
   - In case of AC input
     $W_{IN} = 0.1 \times I_{IN} \times E \times$ No. of input points × Simulataneous ON rate (W)
     I_{IN} = Input current (Rms value in the case of AC) (A)
     E = Input voltage (Voltage of use) (V)
6) Comsumption electric power of special function module.
   $W_S = I_{5V} \times 5 + I_{24V} \times 24$ (W)

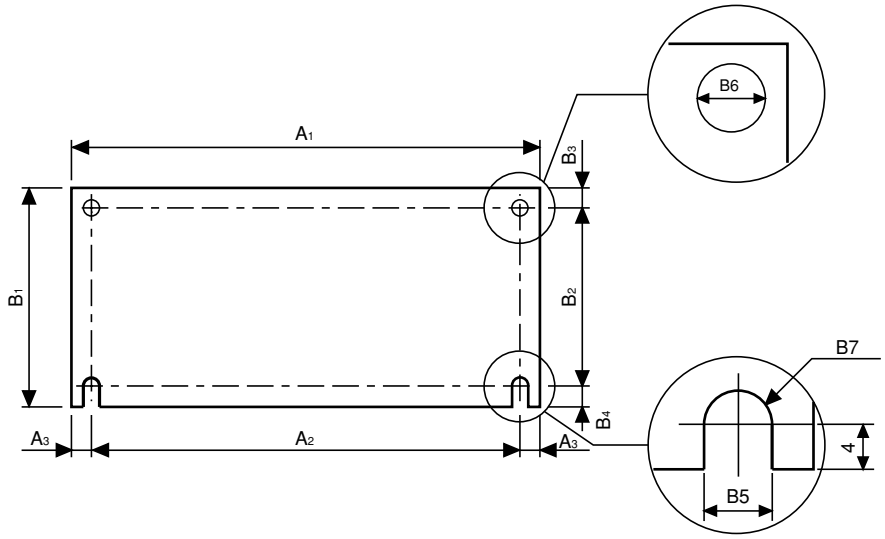
The total of the power consumptions calculated in each module is the power consumption of the entire machine. From this entire power consumption (W), calculate the heat generation and temperature rise in the panel.

5-2 Installation of basic/expansion rack panel

This section explains the installation method of the basic/expansion rack panel in a control panel.
Fix the basic/expansion rack panel on a partition plate of a control box. Select the appropriate fixing place taking into consideration the size of a wiring duct, wiring to the JW30H, a cable length of the I/O expansion cable, ventilation, maintenance, easy access for exchanging modules etc.
We recommend that you install the basic rack panel at the bottom and the expansion rack panel above the basic rack panel.

Note: Use a high conductive partition plate of plating finish for fitting the basic/expansion rack panel so as to increase noise tolerance.

■ **Installation dimensions of basic/expansion rack panel**



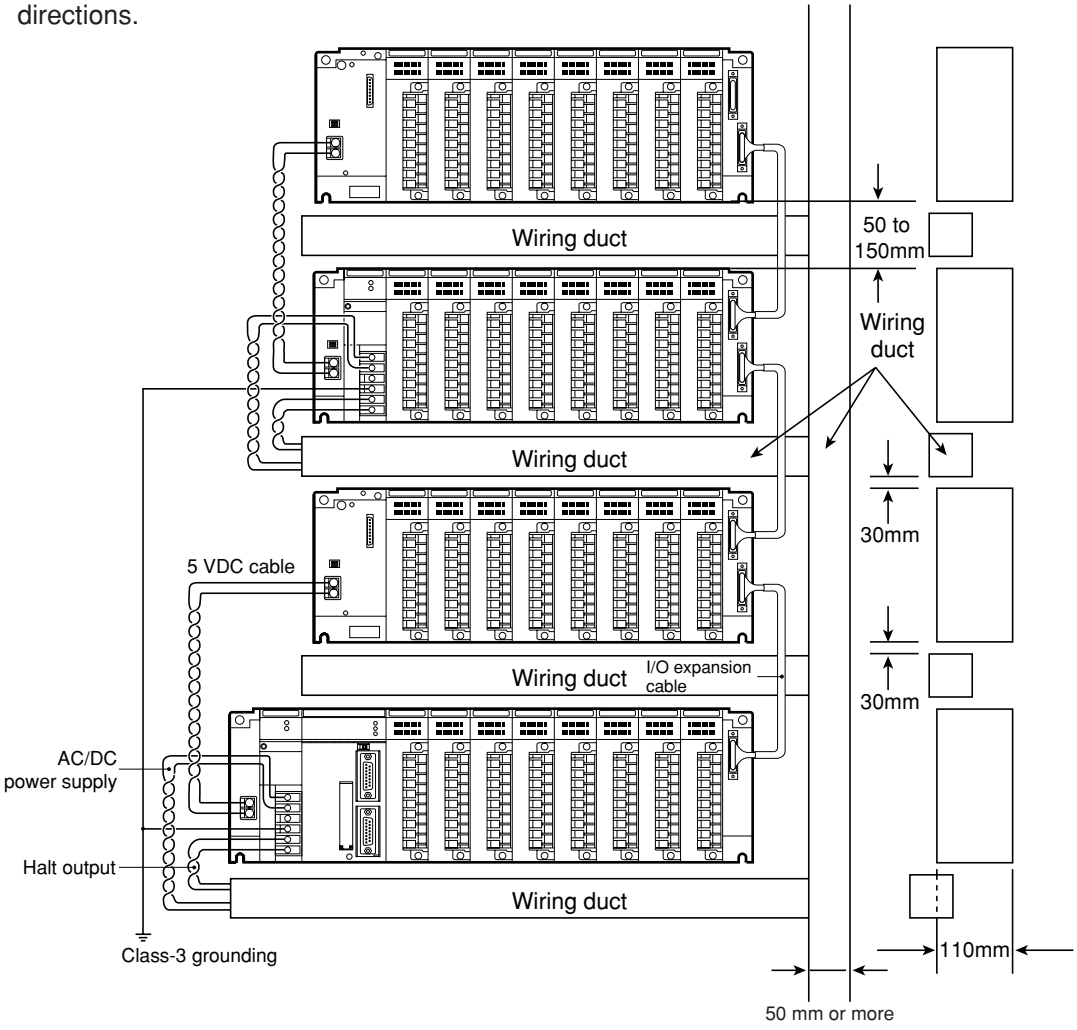
Basic rack panel	Installation dimensions (mm)										Thickness of portion to be inserted (mm)
	A_1	A_2	A_3	B_1	B_2	B_3	B_4	B_5	B_6	B_7	
JW-24KB	297	281	8	130	118	8	4	6	φ6	R3	1.6
JW-34KB											
JW-26KB	368	352	8								
JW-36KB											
JW-28KB	437	421	8								
JW-38KB											

Basic rack panel	Installation dimensions (mm)										Thickness of portion to be inserted (mm)
	A_1	A_2	A_3	B_1	B_2	B_3	B_4	B_5	B_6	B_7	
JW-34ZB	226	210	8	130	118	8	4	6	φ6	R3	1.6
JW-36ZB	297	281	8								
JW-38ZB	368	352	8								

■ Installation of basic/expansion rack panel in control panel

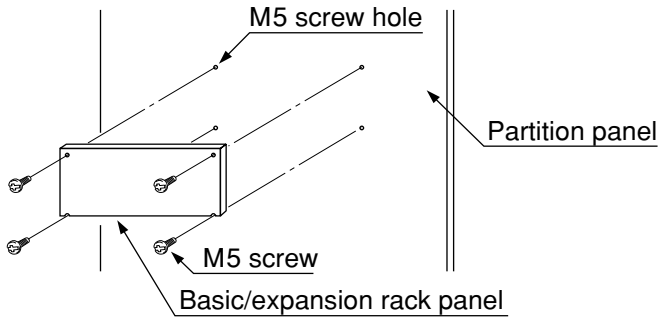
① Drill fitting holes of basic/expansion rack panel and wiring duct on the control panel and partition plate.

- Refer to page 5-2 for fitting dimension of the basic/expansion rack panel. Keep each rack panel at 50 to 150 mm distance and more, from right and left sides of each rack panel to the end of the panel and the wiring duct for 50 mm and more.
- Keep wiring duct 30 mm distance or more from the basic/expansion rack panel for vertical directions.



② Fix basic/expansion rack panel on partition plate using M5 screws.

- Prepare M5 retention screws locally. (Recommended installation screw: M5 × 20 mm)



To the next page

From the previous page

③ Fit wiring duct

- Prepare the retention screws locally.
- Use a wiring duct to enable easy external wiring for the I/O ／ Special I/O ／ I/O link ／ option module of the JW30H. A fitting base of a wiring duct having the same level of the duct enables ease of external wiring.

④ Set the rack no. switch of expansion rack panel.

- See page 4-11 to 13 for setting a rack no. switch.

⑤ Install JW30H system configurating modules to basic/expansion rack panel.

- See page 5-5 to 9 for installation of each module (power supply module, control module, input module etc.)

⑥ Connect I/O expansion cable to basic/expansion rack panel

- I/O expansion cable is to receive signals of each rack panels. Be sure that the total length of the cable does not exceed 14 m (50 m when using an I/O bus expansion adapter).
  See page 6-14 to 15 for connecting the I/O expansion cable.

⑦ Fit partition plate when installing basic/expansion rack panel to control panel.

- Prepare the retention screws locally.

⑧ Ground the partition plate securely after installation.

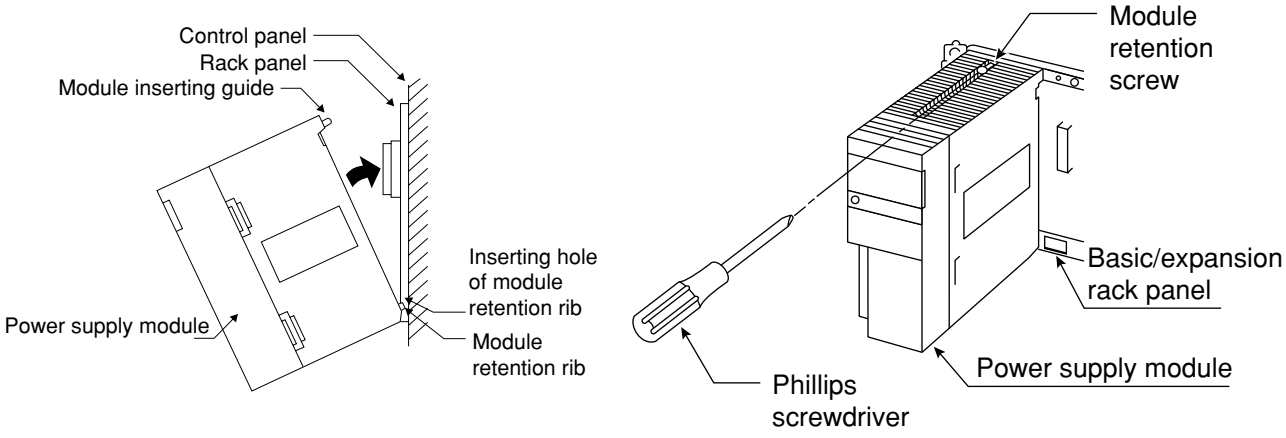
5-3 Installation of power supply module

Power supply module JW-21PU/22PU/31PU/33PU is installed by basic/expansion rack panel.
Be sure to install the power supply module on the basic rack panel. Total consumption current of the power supply module is 3.5 A or less when JW-21PU/22PU/31PU is used, and 4.5 A or less when JW-33PU is used. (See page 7-1 to 3)
Install a power supply module in any of the cases below:

1. When the total consumption current of the power supply module exceeds 3.5 A when JW-21PU/22PU/31PU is used, or 4.5 A when JW-33PU is used.
2. When using JW-25EC/210EC, JW-3EC/10EC/20EC/30EC/50EC, in the I/O expansion cable. Furnish each expansion rack panel with power supply module.
3. When the total length of I/O expansion cable between expansion rack panel covered by the current capacity of one power supply module exceeds 2.1 m.

[Installation]

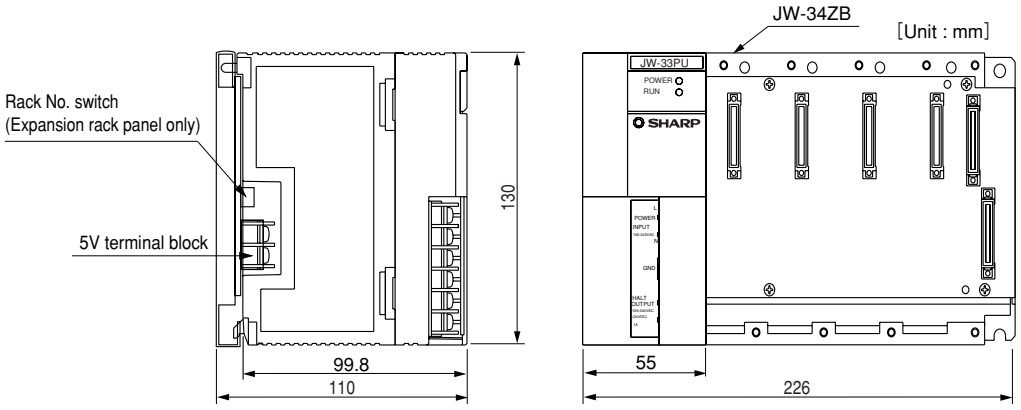
① Keep at the back of the module retention rib hanging on the inserting hole and push the whole body of the power supply module to the panel.
② Tighten module retention screw in upper part of the power supply module using a phillips screwdriver.
Fasten the screw with a torque of less than 1.47 N-m.



Note

Install the power supply module JW-33PU to each rack panel after wiring in 5V terminal block of basic/expansion rack panel and setting switch of expansion rack panel number.

■Installing in expansion rack panel (JW-34ZB)

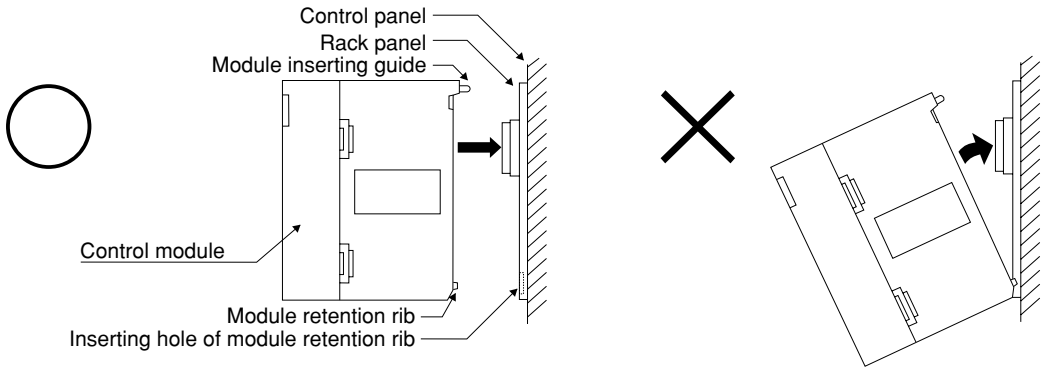


5-4 Installation of control module

Install the control module (JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3) at the basic rack panel (the power supply module on the right.)

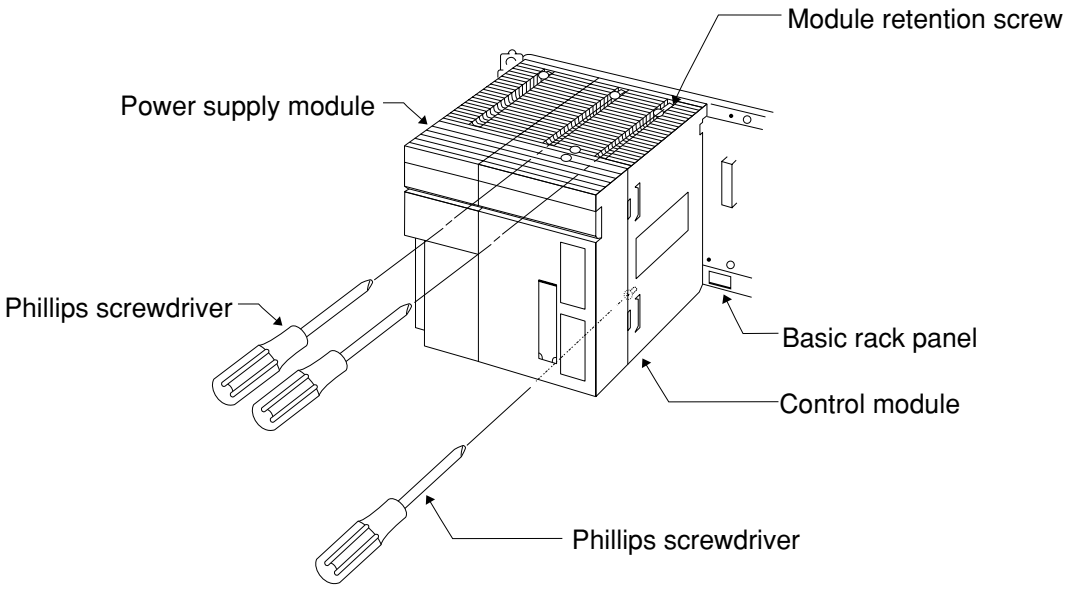
[Installation]

① Insert connector of control module into a slot for control module of basic rack panel.



Note: When a JW-32CUH1 is installed, set the program/file capacity setting switch (SW2) on the back of the control module before the installation. (See page 4-2)

② Tighten module retention screw in upper and lower part of the control module using a phillips screwdriver. Fasten the screw with a torque of less than 1.47 N-m.



5-5 Installation of I/O ／ Special I/O ／ I/O link ／ Option module

[1] Installation to a basic/expansion rack panel

This section contains instructions for installing the I/O ／ special I/O ／ I/O link ／ option module to the basic/expansion rack panel.

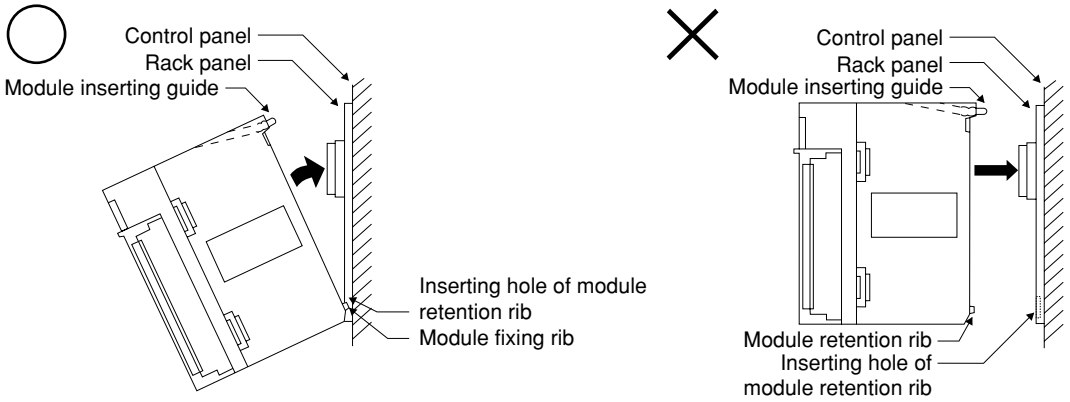
I/O／special I/O／I/O link／option module can be installed together on basic rack panel. However, the I/O link ／ option module cannot be installed on the expansion rack panel.

Prior to installation/removal of the I/O ／ special I/O ／ I/O link ／ option module, switch OFF the power supply to the JW30H.

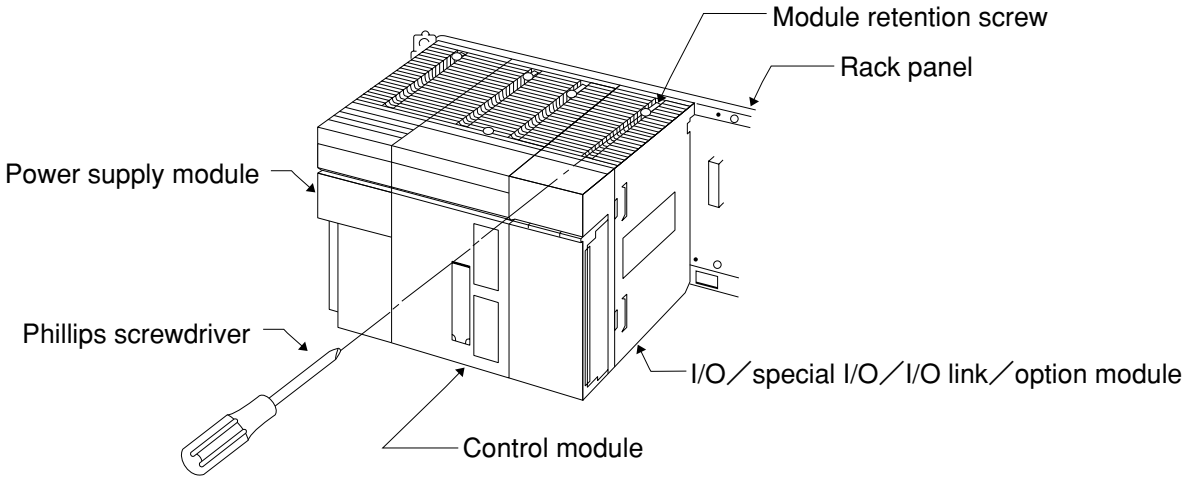
- When setting up the system, arrange so that the total of the current consumptions of each module may be within the output current of the 5 VDC power source supplied from the power supply module. If each module is used beyond the output current of the 5 VDC power source of the power supply module, the current limiting function of the power supply module is actuated to stop the operation of the JW30H.
- Do not neglect to install a surge killer such as varistor on the output line of the relay output module: JW-204S/JW-214SA, as they do not have a surge absorbing circuit. Without installing a surge killer, a sparkling noise from a relay may cause noise trouble to other modules.

[Installation]

① Keep the I/O ／ special I/O ／ I/O link ／ option module hanging on the module retention rib in the inserting hole and push the entire body of the power supply module to the panel.



② Tighten module retention screw in upper part of the I/O／special I/O／I/O link／option module using phillips screwdriver. Fasten the screw with a torque of less than 1.47 N-m.



[2] Installation of module cover

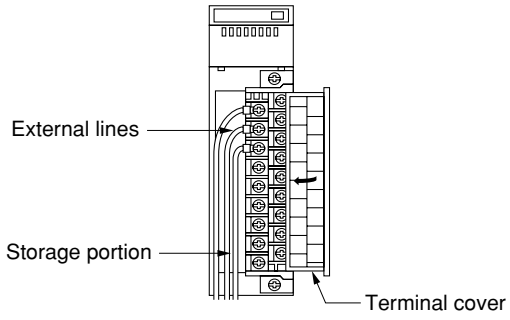
Module cover JW-20CV is a cover fitted on a terminal block of the I/O ／ special I/O ／ I/O link ／ option module to which external cables are connected.

Module covers are ordered separately (8 sets in one pack.)

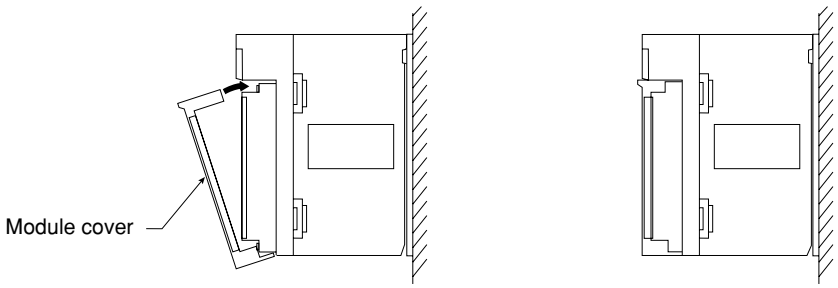
[Installation]

① Put the external lines connected to the I/O ／ special I/O ／ I/O link ／ option module into the portion reserved for storage portion.

- When the external lines can not be stored in the storage portion, repeat connecting the external lines to the terminal block.
- Put the terminal cover on after installing the external lines in the storage portion.



② Hang the screw at the lower part of the module cover on terminal block, and insert the upper part of the module cover between the LED display panel and the terminal block of the module.



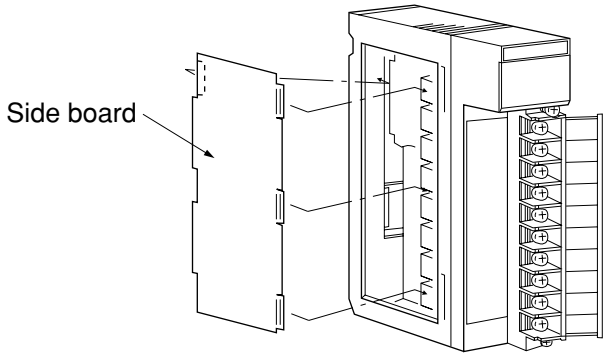
[3] Installation of input/output module side board

When power supply module is not installed in the expansion rack panel, attach the side board for I/O module (called side board hereinafter) to the left end module. The side plate prevents dust from entering into the module. The side board is supplied with the expansion rack panel.

When the power supply module is installed on the expansion rack panel, do not install the side board. Otherwise, module cannot be installed properly.

[Installation]

Hang side board craw on the side of module in order to fix side board, and push side board toward module.

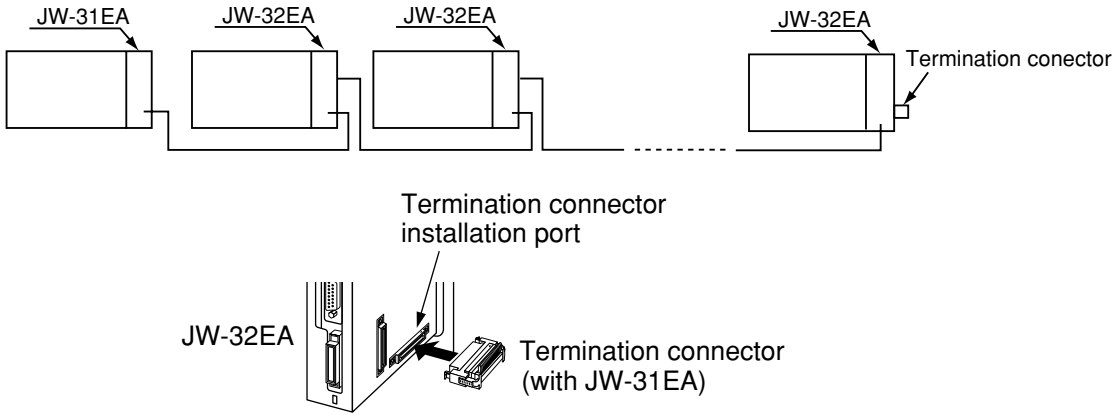


5-6 Installation of I/O bus expansion adapter

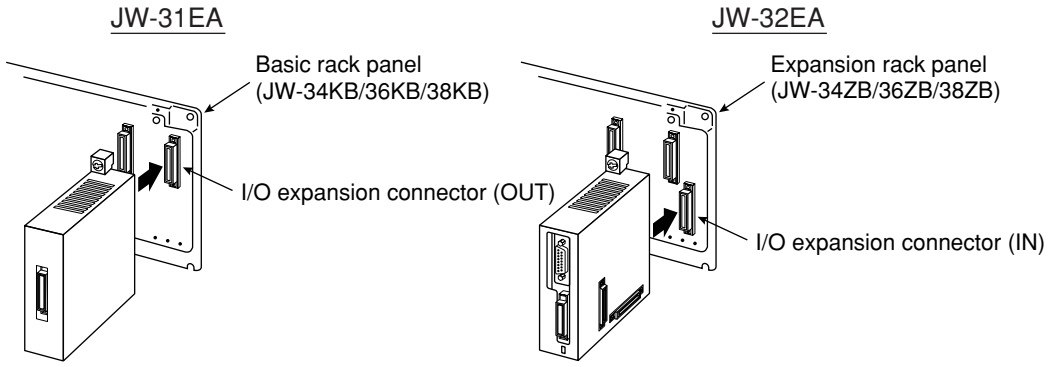
Install an I/O bus expansion adapter, JW-31EA, on an I/O expansion connector on the right edge of the basic rack panel, JW-34KB/36KB/38KB.
Install an I/O bus expansion adapter, JW-32EA, on an I/O expansion connector on the right edge of the expansion rack panel, JW-34ZB/36ZB/38ZB.

[Installation]

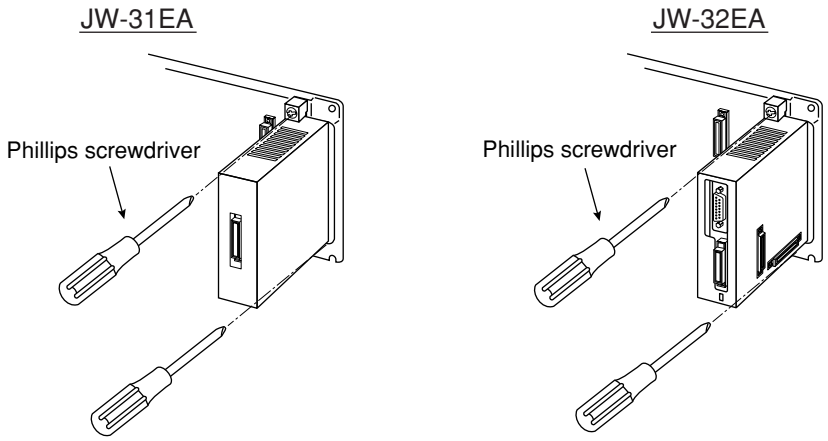
① Insert a termination connector, which is an accessory of the JW-31EA, into the JW-32EA only on the last expansion rack panel.



② Install a JW-31EA in an I/O expansion connector on the basic rack panel, in the same way as a JW-32EA in an I/O expansion connector on the expansion rack panel.



③ Tighten module fixing screws on the upper and lower sides of the I/O expansion adapter. Fasten the screw with a torque of less than 1.47 N-cm.



Chapter 6. Wiring

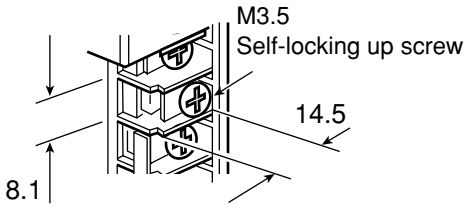
6-1 Precaution for wiring

Follow the below instructions for wiring:

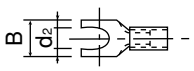
1. Separate power line and I/O lines of the JW30H from high voltage lines and power lines as far as possible. Do not run power lines and I/O lines in parallel with high voltage or power lines.
2. For the I/O expansion cable and wiring the 5 VDC lines, use supplied accessories for the I/O expansion cable.
3. Don't run the I/O expansion cable and the 5 VDC cable inside a duct.
4. Provide easy-to-detach wiring thoroughly considering operability at maintenance and repair.
5. Use twisted cables of over KIV 1.25 square for connection to the primary power input terminal of the power supply module.
6. Use cables of over KIV 0.5 square (0.18 square/32 points connector type) for wiring from the relay terminal block of the control panel to the input module. For wiring to the output module, use cables of over KIV 0.75 square for large capacity such as solenoid valves; and cables of over KIV 0.5 square (0.18 square/32 points connector type), for other usage.
7. Use wires of over KIV 1.25 square for wiring from the relay terminal block to input/output equipment.
8. When the whole factory site is grounded for high electricity and not suitable for the grounding of the JW30H, connect the GND terminal of the JW30H with just the board ground.
9. Use the crimp-style terminals of our recommendation for wiring to the terminal blocks of the JW30H, whenever possible.

Terminal block dimensions (mm)

- Power supply module



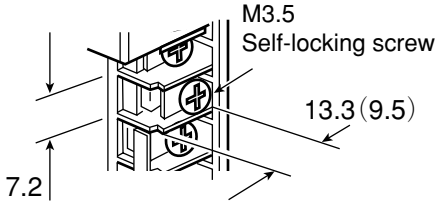
- Crimp-style terminal dimensions



Crimp-style terminals (our recommendation: Made by JAPAN SOLDERLESS TERMINAL MFG. CO., LTD)

Dimensions (mm)	Models
B<8 d_2>4	1.25-YS4A V1.25-YS4A 2-YS4A V2-YS4A

- The other module (dimensions in parentheses are for the two layer terminal blocks)



■ Wiring with noise countermeasures

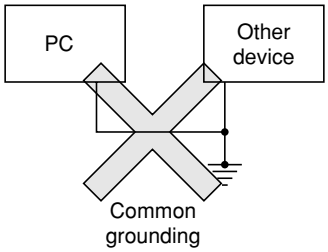
For your safe usage of the JW30H, observe the “Precaution for Wiring” of the previous page carefully. Wiring to prevent the JW30H from malfunction caused by noise is shown below. Besides, some malfunctions by noise come from complex causes or a cause which cannot be analyzed in quantity. Use the following noise countermeasures as your reference, when you take measures for each actual situation.

(1) Grounding

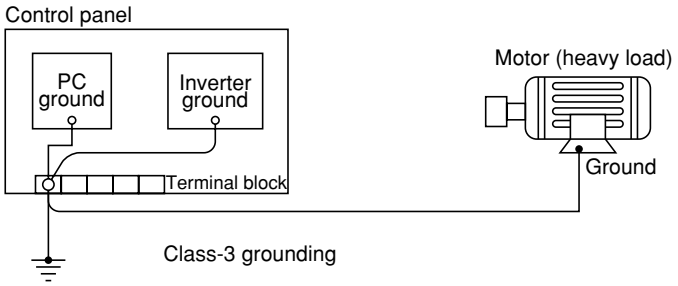
Grounding has two purposes; to protect operators from electric shock and to prevent malfunction by noise. The grounding for noise prevention is shown here.

Don't use a common ground for the JW30H and other device.

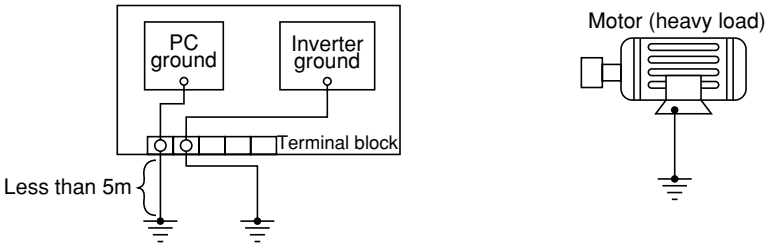
When the GND cable of the JW30H is also used for grounding for other device, noise might come into the JW30H from other device.



Bad example: Don't use the GND line of the JW30H for grounding of a motor or an inverter.



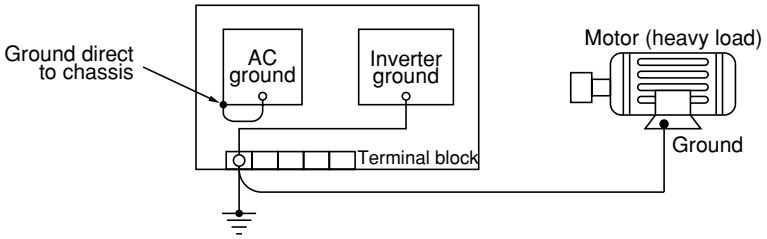
Countermeasure 1: Separate grounding for each of the JW30H, the motor and the inverter.



Use a twisted wire of over 2 mm^2 sectional area and less than 5 m long in grounding the JW30H for the noise prevention purpose.

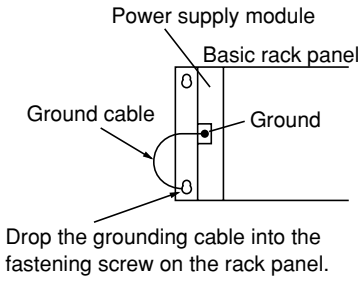
Countermeasure 2: When separate grounding is not available.

If a separate grounding for the JW30H cannot be made, ground directly from the GND terminal of the JW30H to the chassis on which the JW30H is mounted.

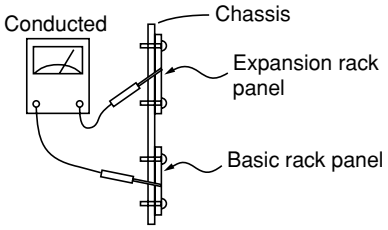


Note: Observe the following points for direct grounding of the GND cable of the JW30H to the chassis:

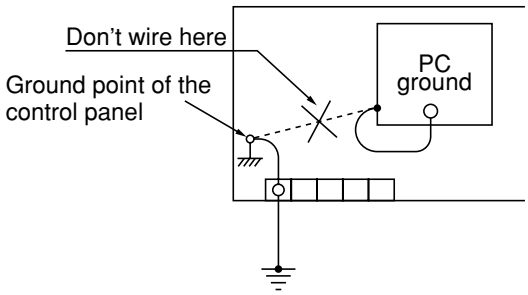
- Connect the grounding cable from the GND terminal of the power supply module of JW30H to the chassis in the minimum distance. The same wiring manner should be used for the expansion rack panel.


Power supply module
Basic rack panel
Ground cable
Ground
Drop the grounding cable into the fastening screw on the rack panel.

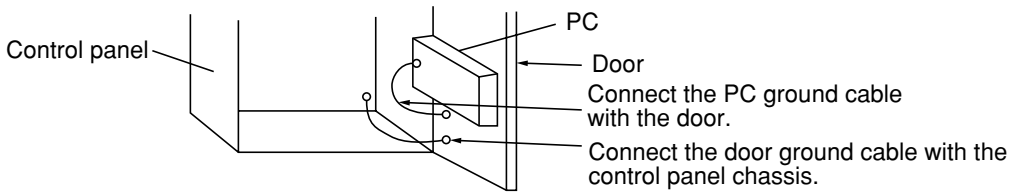
- Install firmly the basic rack panel and the expansion rack panel on the chassis of the control panel and make sure of the electric conductivity.



- Where the control panel itself is grounded, do not wire between the grounding point and the GND terminal of the JW30H.



Reference: Note for fitting the JW30H on the control panel door.
Ground from the GND terminal of the JW30H to the door.
Use a twisted wire of over 2 mm^2 sectional area for grounding cable of the control panel from its door (less than 50 cm.)

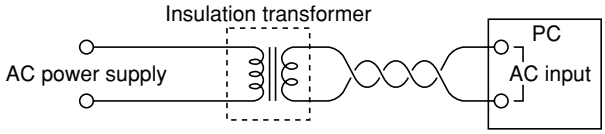

Control panel
PC
Door
Connect the PC ground cable with the door.
Connect the door ground cable with the control panel chassis.

(2) Countermeasure of noise from power supply line

The AC power supply input noise resistance capacity of the JW30H is 1000 Vp-p. When any noise over this limit is possible to come through the power supply line, install an insulation transformer.

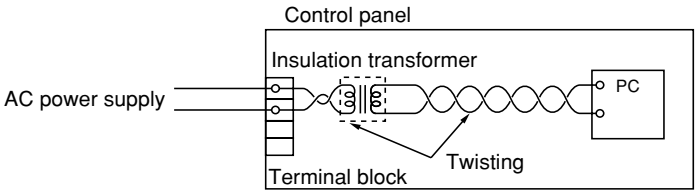
Countermeasure: Install an insulation transformer

Noise has a high frequency of 100 KHz to 2 MHz, which should be blocked by a transformer.



Note: When using an insulation transformer, note the following points:

- An insulation transformer with static electricity shield can also prevent noise by static coupling.
- Install and insulation transformer near the power supply input of the control panel in order to block noise at the entrance of the control panel.

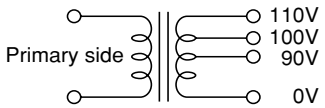


- Use two twisted wires in the primary and secondary sides of the transformer.
- Choose the insulation transformer of the capacity of more than 20% higher than that of the rated load. When a transformer of the same capacity as that of the rated load is used, a primary input voltage might exceed the transformer rated capacity and become dangerous state such as emitting smoke.

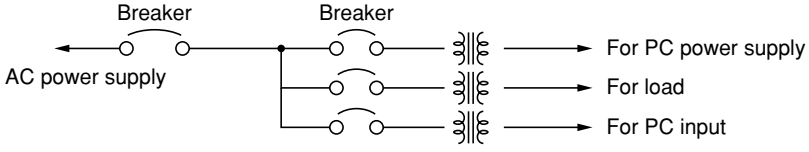
Power supply module	Power consumption*	Using the capacity of transformer
JW-21PU	60 VA or less	72 VA or more
JW-22PU		
JW-31PU		
JW-33PU	70 VA or less	85 VA or more

* Maximum load capacity when one power supply module is used.

- When a large-capacity transformer with higher voltage in the secondary side is chosen, we recommend to install a intermediate voltage tap.

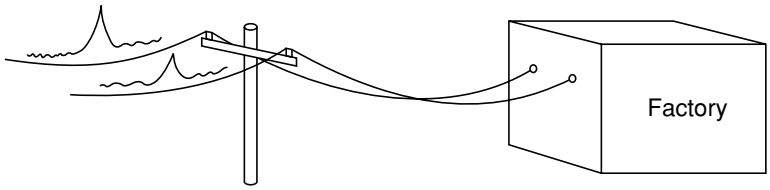


- With particularly large noise, several transformers can be installed, not only to the power supply input of the JW30H but also to the load and AC input.

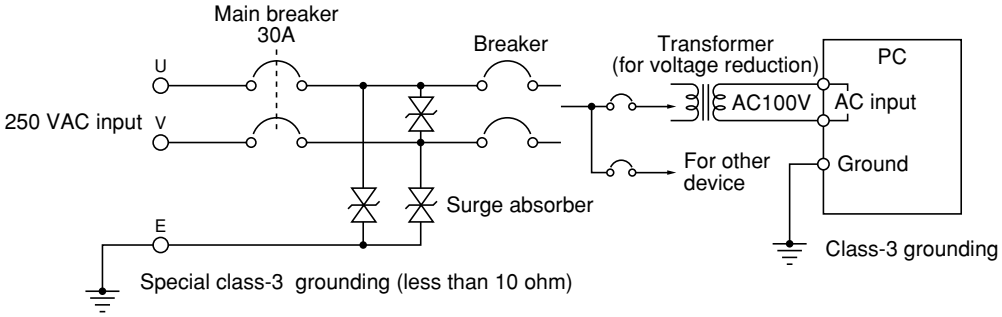


(3) Safeguard from lightning

Below are countermeasures in case when the factory facilities are located far from residential areas and that effects from induced lightning (induced voltage by lightning strikes) are expected. Note, however, that they are not the measures for direct strikes of lightning. In some cases, the voltage of the induced lightning may go beyond 4000 KV. Therefore, the purpose of these countermeasure is just to minimize the damage on the device.



Countermeasure 1: Install a surge absorber on the receiver panel of commercial electric power as protection from induced lightning.
Different models should be chosen according to the facilities load and power supply voltage. For your reference, below is a wiring diagram of the outdoor type cubicle for 1.7 KVA.



Note: Note the following when wiring.

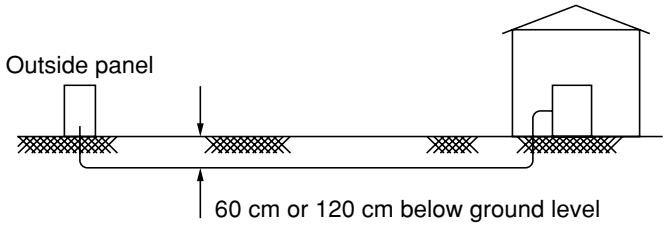
- The ground of the surge absorber is the special class-3 ground (less than 10 ohm ground resistance) and should be separated from the ground of the JW30H. (Class-3 grounding.)
- Install the main breaker before the surge absorber.
- The followings are known surge absorbers in the market. Different types for different power supply voltages.

Commercial power voltage	Model name	Specifications	Manufacturer
100 VAC	ERZ-A20PK251	Varister voltage: 250V ± 10% Surge resistant volume: 5,000A (8/20μs) Energy resistant volume: 90 Joule	Matsushita Electric Co.,Ltd.
200 VAC	ERZ-A20PK501	Varister voltage: 500V ± 10% Surge resistant volume: 5,000A (8/20μs) Energy resistant volume: 150 Joule	

- Use the ground wire of over 3.5mm^2 section area for the surge absorber.

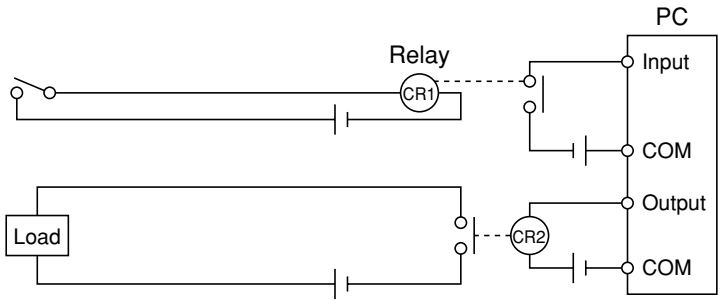
Countermeasure 2: Underground wiring as a countermeasure of lightning.
When communication cables and input cables of the JW30H go out of a building, place them underground. Provide junction for input/output signals using relays.

1. Underground cabling
   In a lightning weather condition, the atmosphere is electrically charged and a wiring in the air induces a voltage of over 24 VDC. Therefore, place the wiring under the ground.



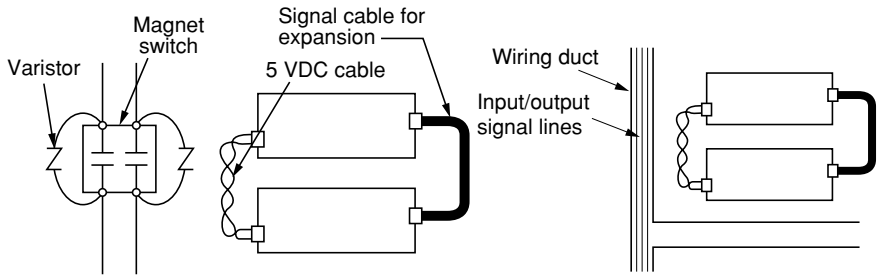
   As for the depth of cable installation, refer to local regulations.

2. Relay connection for the input/output signals using relays.
   The relay isolates the effects of lightning and minimizes the damage.



(4) Wire of signal cable for expansion

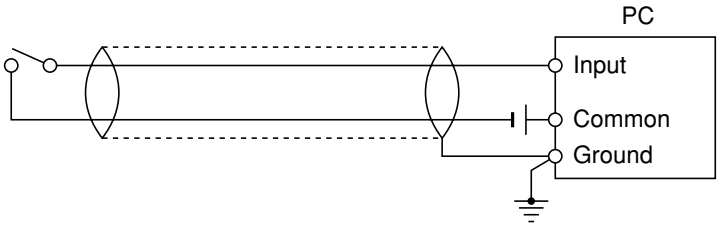
When turning ON/OFF of the magnet switch installed near the JW30H and the signal cable for expansion, high noise and high voltage may occur to give bad effects on the operation of the JW30H. Therefore, for prevention of the noise occurrence, insert a noise killer, such as a varistor, at the contact point of the magnet switch. Do not place the signal cable for expansion and the 5 VDC cable inside the duct, through which input/output signal lines and power lines are running.



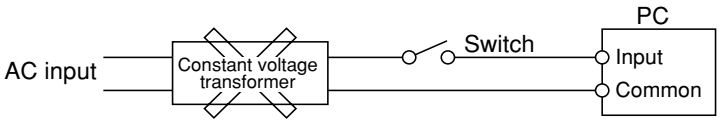
(5) Note for external wiring to I/O module

1. Relay output module: JW-204S/JW-214SA
   Since the relay output module does not have a built-in surge absorbing circuit, do not forget to install a surge killer, such as a varistor, in the output side. Operation without a surge killer might give bad effects on other modules by spark noises from the relay. As for the surge killer, see page 7-12 "Precautions for operating I/O module."

2. DC input module: JW-202N/234N, JW-212NA/214NA
   When extending the external line of the DC input module for more than 100 m, use shielding wire. Even in case of less than 100 m extension, shielding wires should be used under certain conditions. Do not forget to connect the shield of the shielding wire with the ground of the JW30H.



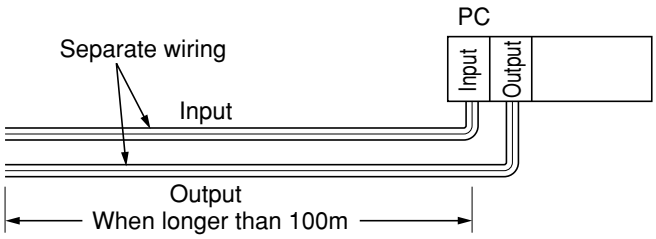
3. AC input module: JW-201N/203N, JW-211NA
   Do not use the outputs from a constant voltage transformer and an AC regulator, for the AC power supply to the AC input module. When the constant voltage transformer and the AC regulator are used, the module signal could be turned ON even with an input voltage less than the rate voltage due to a high distortion rate (10 to 50%) of alternative current waves.
   The power supply to the AC input module should have a distortion rate of less than 5%.



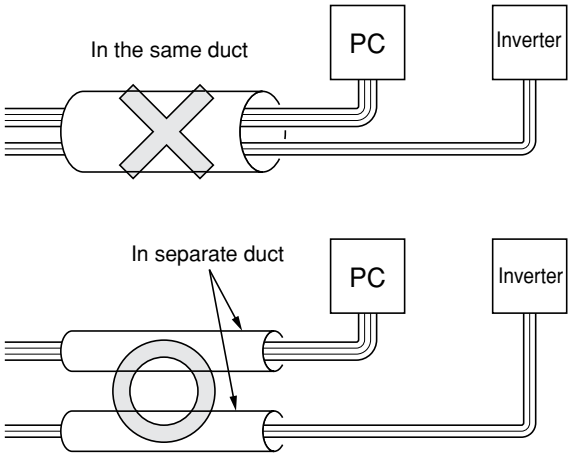
4. Wiring with power line

   Do not run the input signal, output signal and communication cables of the JW30H near and in parallel with the power line.

   • When input and output signal cables are extended over 100 m, make separate wiring for the input signal and the output signal of JW30H.



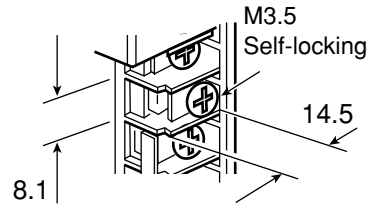
   • Make separate wiring for the input signal and the output signal of the JW30H from the power line. Particularly with the power line for the inverter and the servo driver, do not place signal wires inside the same duct or pipe with the power line, even if they are less than 100 m.



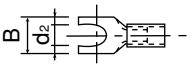
6-2 Wiring for power supply module

In order to prevent wire wastes from dropping into the module through a ventilation hole of the module during the wiring work, keep the caution label stuck onto the upper side of the module. Peel the caution label off of the module when all wiring work is finished.
Fit a cover on the terminal block at delivery. Take off a cover on the power terminal block when wiring, and put the cover back on the terminal block when wiring work is finished.
For wiring, use a twised wire of over KIV1.25 square and crimp-style terminals.

- Power supply terminal block dimension (mm)



- Crimp-style terminal dimensions



Crimp-style terminals (our recommendation: Made by JAPAN SOLDERLESS TERMINAL MFG. CO., LTD)

Dimensions (mm)	Models
B<8 d_2>4	1.25-YS4A 2-YS4A V1.25-YS4A V2-YS4A

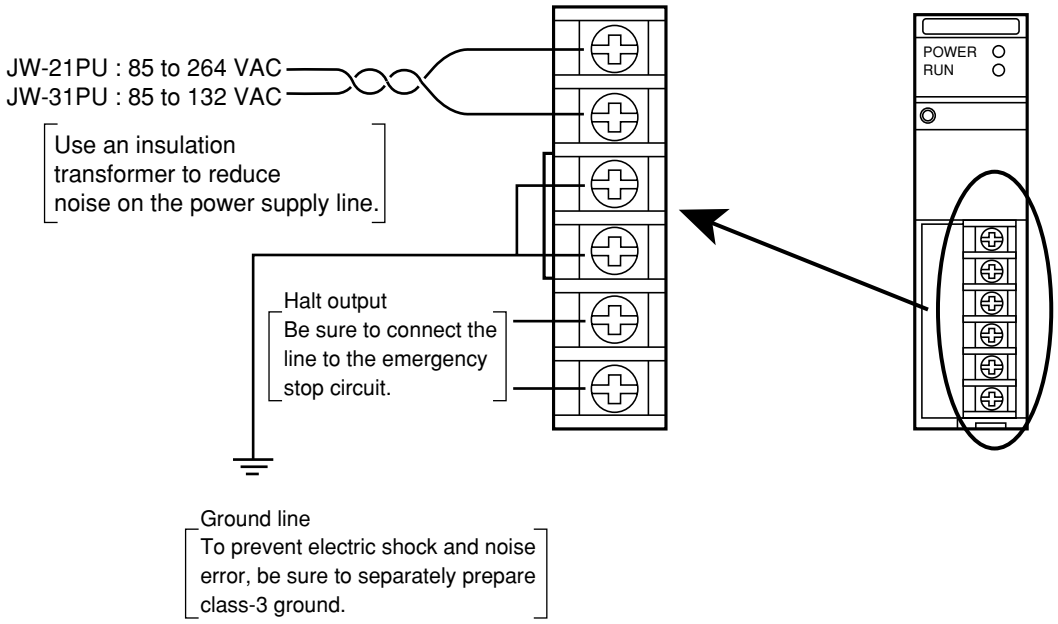
Fasten the screw on the terminal block with a torque of less than 1.18 N-m.

Notes

- Wiring of halt output on the power supply module that is mounted on the expansion rack panel is not necessary. Only the halt output on the power supply module that is mounted on the basic rack panel should be connected to an external operation ready circuit.
- In the case where the power supply module is installed on the expansion rack panel for operating the JW30H, use one power supply system for both power supply module on the basic rack panel and the expansion rack panel. If each power supply is wired from a different system, the JW30H does not run when either one is switched OFF.

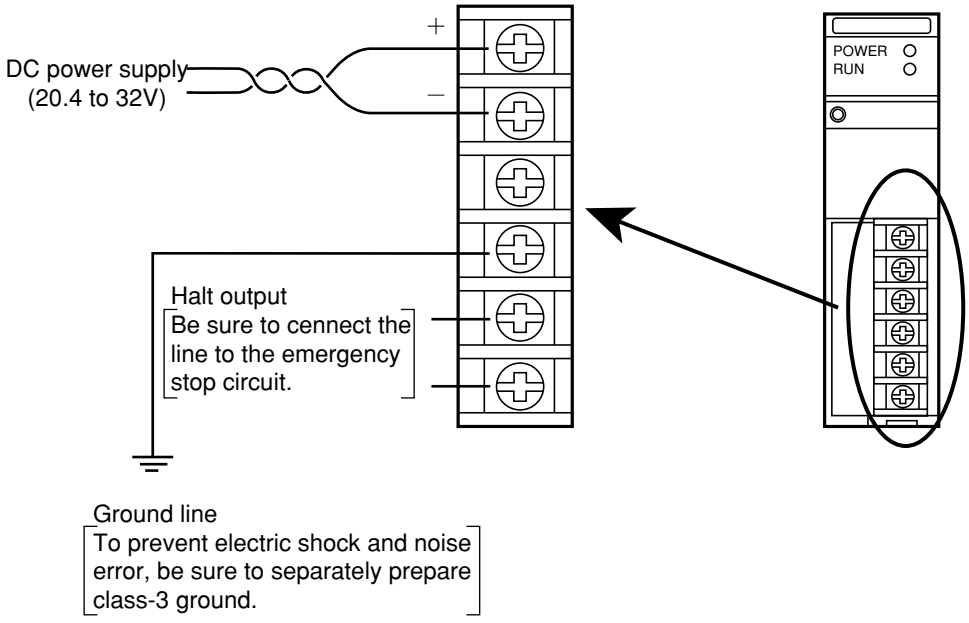
[Wiring figure]

① JW-21PU/31PU (AC power supply module)


JW-21PU : 85 to 264 VAC
JW-31PU : 85 to 132 VAC
Use an insulation transformer to reduce noise on the power supply line.
Halt output
Be sure to connect the line to the emergency stop circuit.
POWER
RUN
Ground line
To prevent electric shock and noise error, be sure to separately prepare class-3 ground.

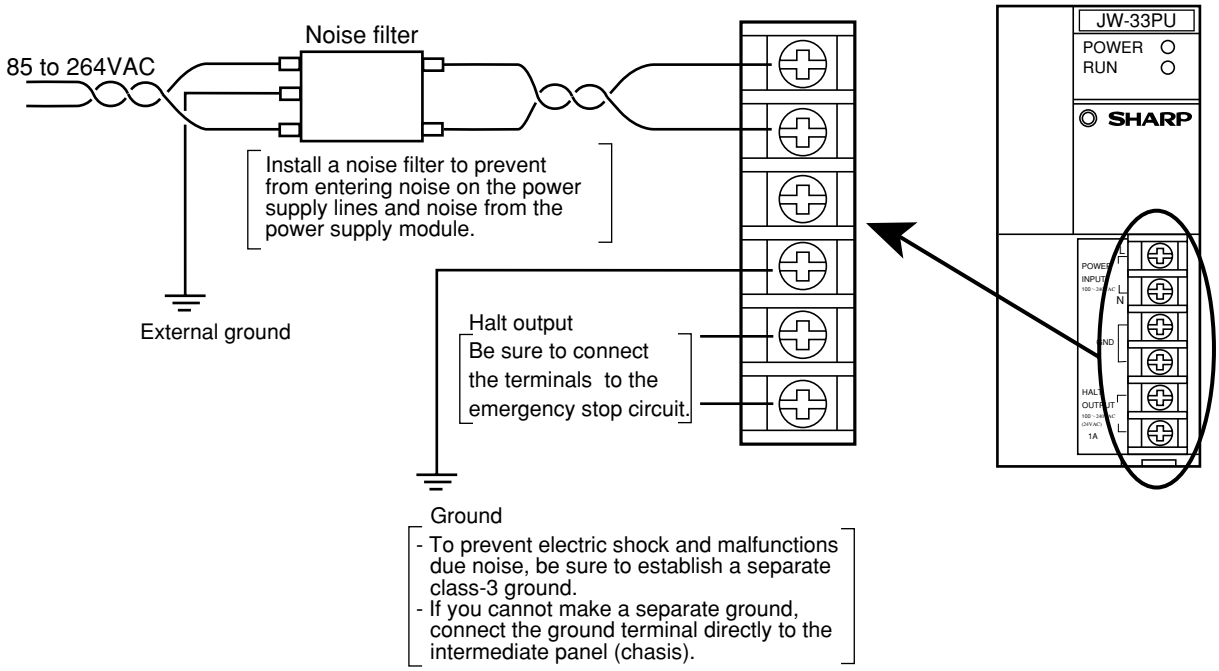
- Connect the power supply input of JW-21PU/31PU while paying attention to the L terminal (LIVE: ungrounded side) and N terminal (NEUTRAL: grounded side).

② JW-22PU (DC power supply module)



- Ensure correct connection for polarity of the input power supply. Mis-connection of the polarity will destroy the module when power is supplied.
- As for DC input power supply, use power supply of 20.4 to 32 VDC (ripple rate 20% or less; however, ripple upper limit: 32 V or less, lower limit: 20.4 V or more).

③ JW-33PU (AC power supply module)

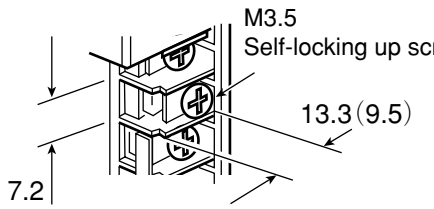

Noise filter
85 to 264VAC
Install a noise filter to prevent from entering noise on the power supply lines and noise from the power supply module.
External ground
Halt output
Be sure to connect the terminals to the emergency stop circuit.
Ground
- To prevent electric shock and malfunctions due noise, be sure to establish a separate class-3 ground.
- If you cannot make a separate ground, connect the ground terminal directly to the intermediate panel (chasis).
JW-33PU
POWER
RUN
SHARP
POWER INPUT
L
N
GND
HALT OUTPUT
1A

Connect the power supply input to the JW-33PU terminal. Pay special attention to the L terminal (LIVE : ungrounded side) and the N terminal (NEUTRAL : grounded side).

6-3 Wiring for I/O module

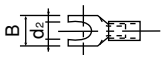
Before wiring to the I/O module confirm the specifications of the module. If the module is used under the conditions beyond its rated specifications, the module might be damaged, destroyed or cause fire. Wiring to the I/O module, use a twisted wire of over KIV 0.5 square (over KIV 0.75 square in case of wiring to the output module of large capacity, such as solenoid valves) and crimp-style terminals. For the common line, use bigger wires than the above.
In order to prevent wire wastes from dropping into the module through a ventilation hole of the module during the wiring work, keep the caution label stuck onto the upper side of the module. Peel the caution label off of the module.

- Terminal block dimension (mm)



(Dimension in parentheses two layer terminal blocks)

- Crimp-style terminal dimensions



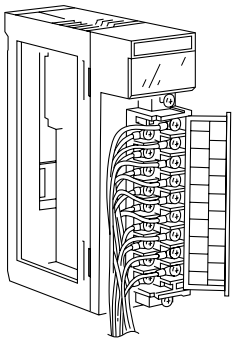
Crimp-style terminals (our recommendation: Made by JAPAN SOLDERLESS TERMINAL MFG. CO., LTD)

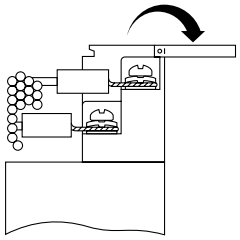
Dimensions (mm)	Models
B<7.2 d_2>4	1.25-YS4A 2-YS4A V1.25-YS4A V2-YS4A

Do not include the I/O lines in the same pipe or duct as high-voltage lines and power lines.
It might cause malfunction or damage to the module.
Avoid wiring over the operation indicator (LED indication port) of the module.

[1] Terminal block type of 8/16 points

Open the terminal cover of the module when wiring.





Ensure correct connection for polarity of the input power supply. Mis-connection of the polarity will destroy the module when power is supplied.
Fasten the screws on the terminal block with a torque of less than 1.18 N-m.
After the wiring work, close the terminal cover and install a module cover: JW-20CV (optional), wherever possible. (See page 5-8)

[2] Connector type of 32/64 points

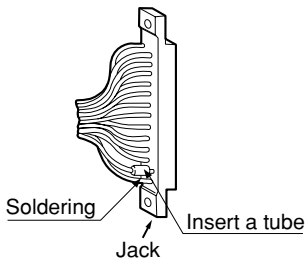
(1) Assembly of the connector

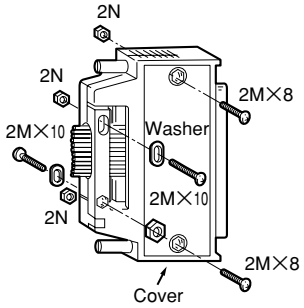
Note that the terminal numbers of the connector are not identical with address numbers.

① Insert insulation tube into signal line.

② Solder signal line to connector terminal. Confirm the connector terminal and its address number, before soldering.

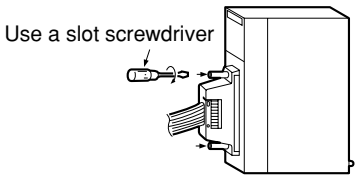
③ Assemble connector. Assembly parts (screws, washers and nuts) are attached to the connector.





Use the following recommended cable for the signal line.
Recommended cable: Multiple vinyl insulation vinyl sheath cable
18P × 0.18 57VV-SB (made by FUJIKURA LTD.)

(2) Connection with the module



Ensure correct connection for polarity of the input power supply. Mis-connection of the polarity will destroy the module when the power is supplied.
Attached connector of 32/64 points I/O module is soldering type, and available for connector of pressure welding/crimp-style.

Wiring	Model name	Manufacturer	Recommended wiring size	Remarks
Pressure welding	FCN-367J040-AU/F (Connector)	FUJITSU CO., LTD	Flat cable 1.27 mm pitch AWG28 (twisted wire) AWG30 (single wire)	Recommended our crimp-style of tool made by FUJITSU CO., LTD.*1
Crimp-style	FCN-360C040-B (Connector cover) FCN-363J040 (Housing) FCN-363J-AU (Contact)		AWG24 to AWG28 Strip outer of cable is Ø1.2 or less	Recommended our crimp-style tool made by FUJITSU CO., LTD.*2
Soldering	FCN-360C040-B (Connector cover) FCN-361J040-AU (Connector)		AWG23 to 26 (0.26 to 0.12 mm^2)	Accessories

*1 Hand press: FCN-707T-T101/H Cable cutter: FCN-707T-T001/H
Locator plate: FCN-367T-T012/H

*2 Manual crimp tool: FCN-363T-T005/H

6-4 Wiring for basic/expansion rack panel

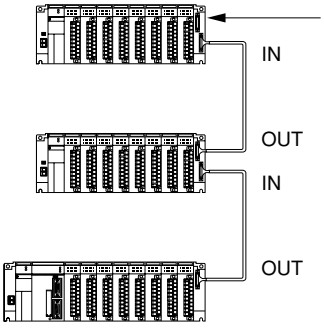
[1] Installation of I/O expansion cable

(1) Install basic/expansion rack panel in direct

Connects between the basic rack panel and the expansion rack panel, or between the expansion rack panel and another expansion rack panel using following cables.
(Max. 4 racks can be connected)

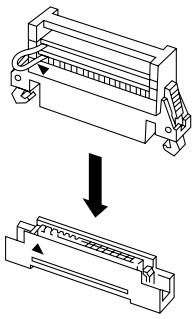
Model name	Cable length	Remarks
JW-203EC	30 cm	With 5 VDC cable (30 cm)
JW-207EC	70 cm	With 5 VDC cable (70 cm)
JW-22EC	2 m	With 5 VDC cable (2 m) and a short connector
JW-25EC	5 m	With short connector, Without 5 VDC cable
JW-210EC	10 m	

When connecting the I/O expansion cable, take care with the IN and OUT parts of each rack panel as follows. Mis-connection indicates "I/O table verify error $60_{(H)}$" or "I/O table registration error $70_{(H)}$" and the JW30H cannot start operation.



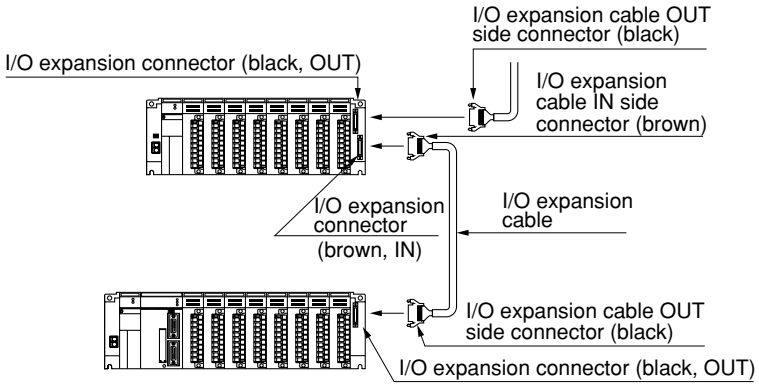
When using the JW-22EC/25EC/210EC with the I/O expansion cable, be sure to install a short connector (for termination resistance) in OUT side of the final expansion rack panel. Otherwise, an error may occur.
When using only JW-203EC/207EC, installation of short connector is unnecessary.
- Separate sale of only the short-circuit connector (QCNCW5252NCZZ) is also available.

Short connector

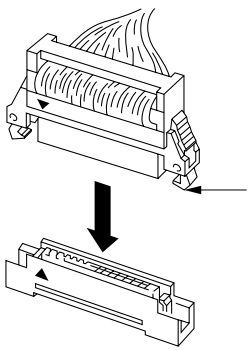


Allowable total length of the I/O expansion cable is 14 m max.
When connecting the I/O expansion cable with each rack panel, be careful of its installation position and direction, and fix firmly using lock lever.

Fitting position of I/O expansion cable


I/O expansion cable OUT side connector (black)
I/O expansion connector (black, OUT)
I/O expansion cable IN side connector (brown)
I/O expansion connector (brown, IN)
I/O expansion cable
I/O expansion cable OUT side connector (black)
I/O expansion connector (black, OUT)

Fitting direction of I/O expansion cable



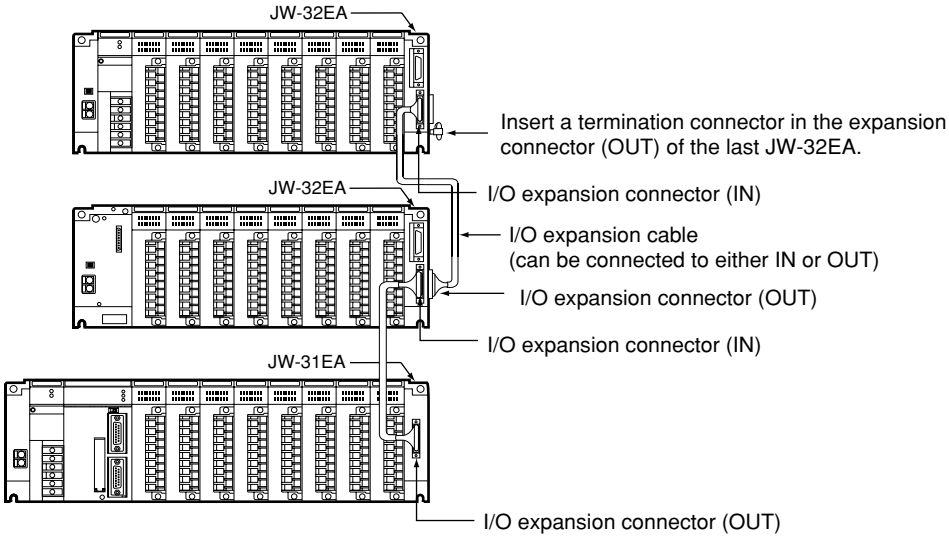
Note 1: When using the JW-25EC, JW-210EC as an I/O expansion cable, fix the shield line of the I/O expansion cable at fixing rack panel.

(2) When installing in an I/O bus expansion adapter

Connect an I/O bus expansion adapter, JW-31EA (mounted on a basic rack panel), to a JW-32EA (installed in an expansion rack panel), or between two JW-32EAs using one of the following cable assemblies. (Max. 8 racks can be connected).

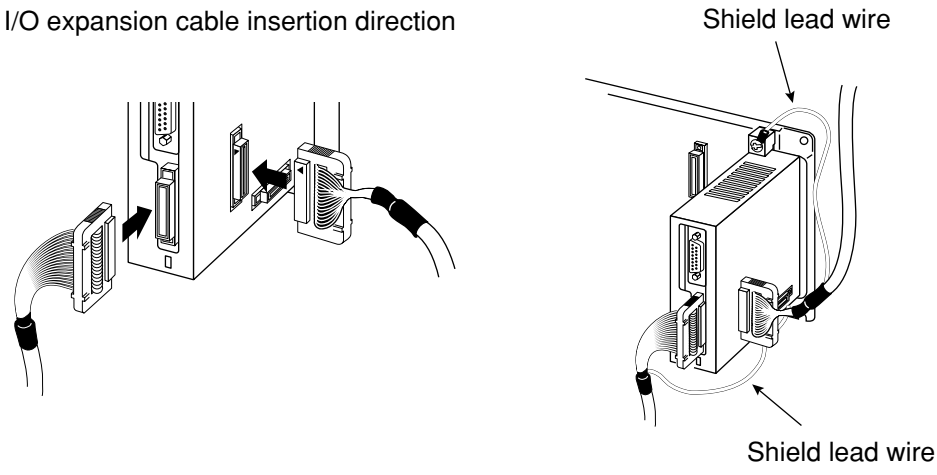
Model name	Cable length	Remarks
JW-05EC	50 cm	With 5 VDC cable (50 cm)
JW-1EC	1 m	With 5 VDC cable (1 m)
JW-3EC	3 m	No accessories
JW-10EC	10 m	
JW-20EC	20 m	
JW-30EC	30 m	
JW-50EC	50 m	

When an I/O expansion cable is connected, do it correctly as shown in the figure below while being careful of the IN and OUT connection of the I/O bus expansion adapter. If IN and OUT are inversely connected, the JW30H will not start operation and become either "I/O table verify error $60_{(H)}$" or "I/O table registration error $70_{(H)}$" status.


JW-32EA
Insert a termination connector in the expansion connector (OUT) of the last JW-32EA.
JW-32EA
I/O expansion connector (IN)
I/O expansion cable
(can be connected to either IN or OUT)
I/O expansion connector (OUT)
I/O expansion connector (IN)
JW-31EA
I/O expansion connector (OUT)

The total length of cables must be no more than 50 meters.

Put the each end of the shield lead wire of the I/O expansion cable in between the module fixing screw and the I/O bus expansion adapter, and then tighten the screws.

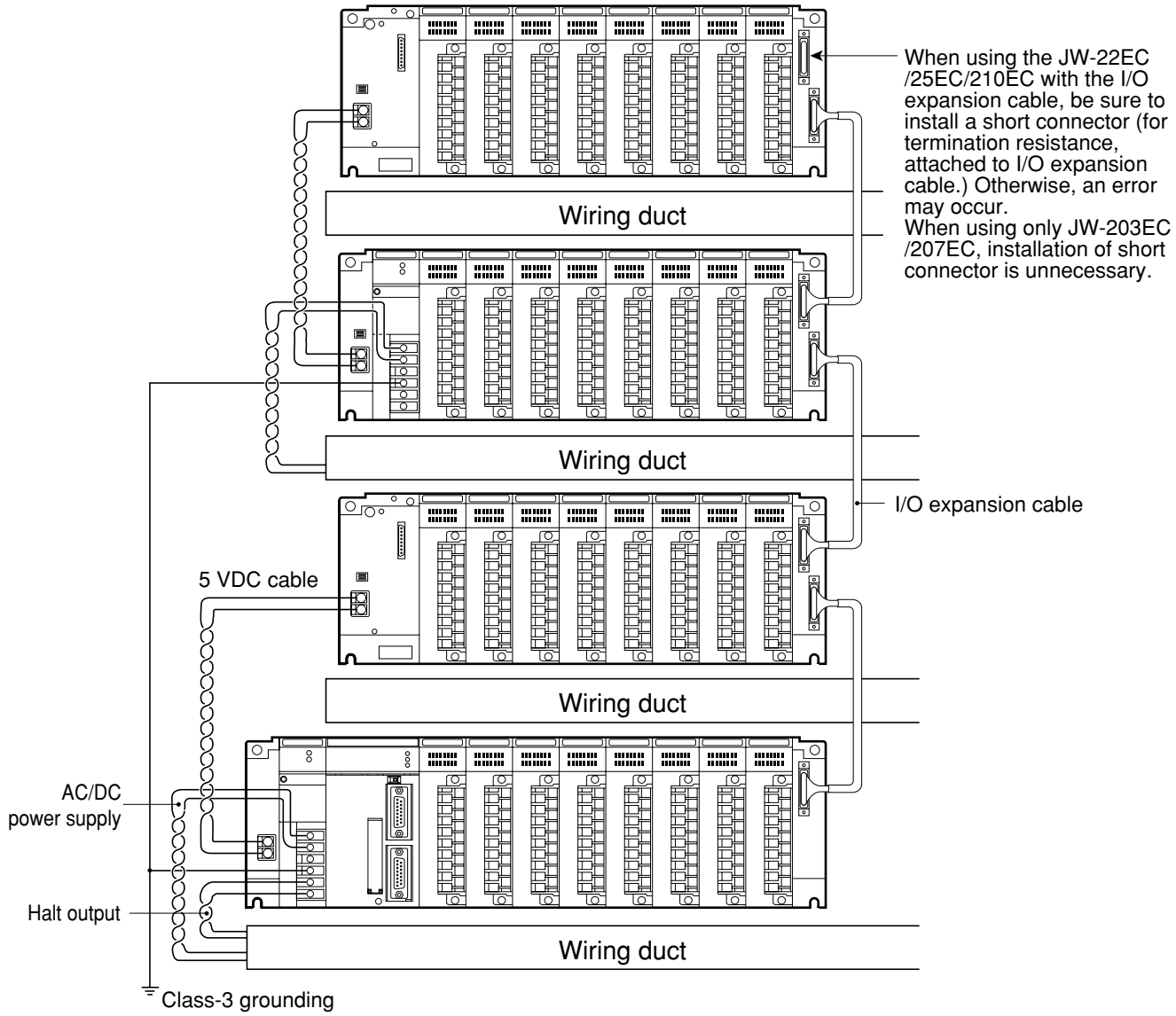


[2] Wiring for 5 VDC cable, process of panel wiring

Be sure to supply 5 VDC to the expansion rack panel without power supply module, through the 5 VDC terminal block of the basic/expansion rack panel with power supply module. Without a supply of 5 VDC power supply, the I/O module cannot run.

- Be careful not to mistake polarity in connection of basic/expansion rack panel into the 5 VDC terminal block. Mis-connections might damage the module or cause fire.
- Do not use a 5 VDC cable for connection between rack panels that are used to install power supply modules. Connect these may cause malfunction.
- For wiring to the 5 VDC terminal block, use crimp-style terminals.
- In order to prevent wire wastes from dropping into the module through a ventilation hole of the module during the wiring work, keep the caution label stuck onto the upper side of the module. Peel the caution label off of the module.
- Fasten the screw on the terminal block with a torque of less than 1.18 N-m.

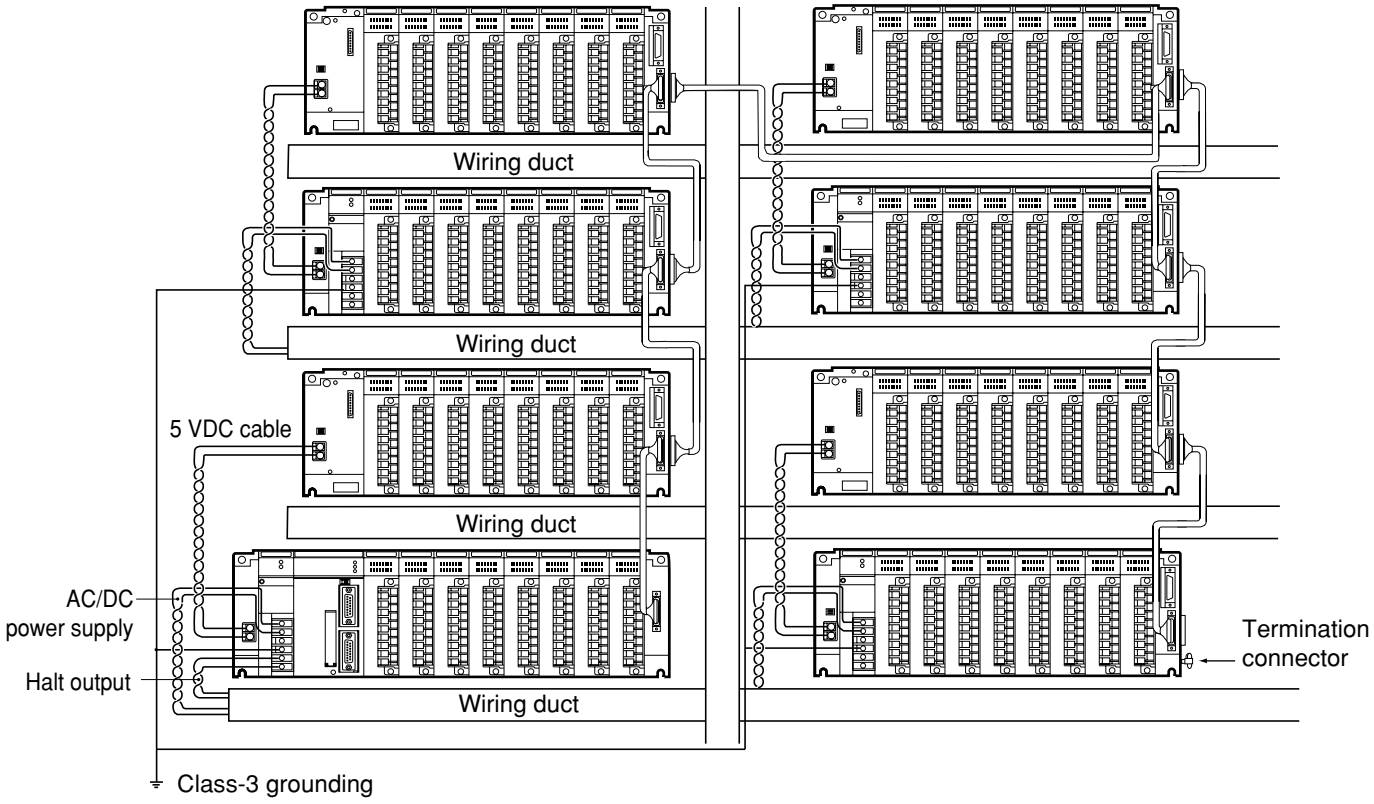
(1) Wiring processing example of four rack systems


When using the JW-22EC /25EC/210EC with the I/O expansion cable, be sure to install a short connector (for termination resistance, attached to I/O expansion cable.) Otherwise, an error may occur.
When using only JW-203EC /207EC, installation of short connector is unnecessary.
Wiring duct
Wiring duct
Wiring duct
Wiring duct
I/O expansion cable
5 VDC cable
AC/DC power supply
Halt output
Class-3 grounding

Connect AC/DC power supply to the power supply module from the same power.

Do not place the I/O expansion cable and the 5 VDC cable in the same duct or pipe as the I/O lines and the power lines of the JW30H.

(2) Wiring processing example of eight rack systems



Chapter 7. Directions for use

7-1 Current consumption of module

Each module in the JW30H operates by 5 VDC output current supplied by the power supply module: JW-21PU/22PU/31PU/33PU. The make up the system configuration plan is such that the total current consumption of each module does not exceed the current capacity of the power supply module. When the total current consumption of each module exceeds the supply capacity, the JW30H stops operation by the current limit function of the power supply module.

The current consumption in each module can be found using the following two methods:

1. Total numbers of a current consumption indication marks which are shown on stickers next to model indication label in each module.
2. Calculate the total current consumption.

• **Output current of 5 VDC power supply**

Model name	Output voltage	Output current
JW-21PU	5 VDC	3.5 A
JW-22PU		
JW-31PU		
JW-33PU		4.5 A

(1) Current consumption of each module

① Control module

Model name	Current consumption: mA	No. of current consumption mark
JW-31CUH (Control module)	500	------
JW-32CUH (Control module)	500	
JW-33CUH (Control module)	500	
JW-31CUH1 (Control module)	650	
JW-32CUH1 (Control module)	650	
JW-33CUH1(Control module)	650	
JW-33CUH2 (Control module)	650	
JW-33CUH3 (Control module)	650	

② Support tools

Model name	Current consumption: mA	No. of current consumption mark
JW-14PG (Hand-held programmer)	200	------
JW-13PG (Hand-held programmer)	200	
JW-12PG (Hand-held programmer)	200	
JW-2PG (Hand-held programmer)	200	

③ I/O bus expansion adapter

Model name	Current consumption: mA	No. of current consumption mark
JW-31EA (I/O bus expansion adapter)	600	------
JW-32EA (I/O bus expansion adapter)	450	

④ Input/output ／ special I/O ／ I/O link ／ option module

	Model name	Current consumption : mA (when all points ON)	No. of current consumption mark
I/O	JW-201N (100/120 VAC input)	40	1
	JW-202N (12/24 VAC input)	40	1
	JW-203N (200/240 VAC input)	40	1
	JW-211N (100/120 VAC input)	60	1
	JW-211NA (100/120 VAC input)	60	1
	JW-212N (12/24 VDC input)	60	1
	JW-212NA (100/120 VAC input)	60	1
	JW-214N (12/24 VDC input)	60	1
	JW-214NA (12/24 VDC input)	60	1
	JW-234N (12/24 VDC input)	80	1
	JW-202S (5/12/24 VDC output)	190	2
	JW-203S (100/240 VAC output)	130	2
	JW-204S (Relay output)	380	4
	JW-212S (5/12/24 VDC output)	60	1
	JW-212SA (5/12/24 VDC output)	60	1
	JW-213S (100/240 VAC output)	260	3
	JW-213SA (100/240 VAC output)	260	3
	JW-214S (Relay output)	550	5
	JW-214SA (Relay output)	550	5
	JW-232S (5/12/24 VDC output)	320	3
	JW-232M (12/24 VDC input, 5/12/24 VDC output)	200	2
Special I/O	JW-264N (24 VDC input)	60	1
	JW-262S (5/12/24 VDC output)	300	3
	JW-21HC (High speed counter)	120	2
	JW-22HC (High speed counter)	100	1
	JW-24AD (Analog input)	90	1
	JW-22DA (Analog output)	75	1
	JW-21DU (ID control module)	400	4
	JW-22DU (ID control module)	400	4
	JW-21SU (Serial interface module)	170	2
	JW-21PS (Pulse output module)	150	2
I/O link	JW-23LMH (I/O link master module)	120	2
Option	JW-21CM (Link module)	125	2
	JW-22CM (Network module)	360	4
	JW-21MN (ME-NET module)	360	4
	JW-25CM (JW/O link module)	130	2
	JW-255CM (Ethernet module)	370	4
	JW-20FL5 (FL-net module)	350	4
	JW-20FLT (FL-net module)		
	JW-20DN (DeviceNet master module)	200	2
JW-21RS (remote I/O slave station)		140	2

(2) Calculation of current consumption (by current consumption mark).

Add up the total numbers of the current consumption mark on strickers next to the model name label.

One mark of current consumption means approx.100 mA.

Constitute a system in order to follow the below conditions:

Count the current consumption marks of each module which is supplied power, and the total number of the mark should not exceed 35.

The example below is calculated on the conditions that 7 control modules, 2 support tools, 6 I/O bus expansion adapters JW-31EA, and 5 JW-32EA are used.

[Example] Calculation of the total current consumption in the system configiration below:

Control module	: JW-33CUH1	
Hand-held programmer	: JW-14PG	
100/120 VAC input module	: JW-201N	8 sets
	: JW-211NA	8 sets
100/240 VAC output module	: JW-203S	8 sets
	: JW-212SA	8 sets

	No. of marks
JW-33CUH1 + JW-14PG	9
JW-201N	8
JW-211NA	8
JW-203S	16
JW-212SA	8
Total	49

The number of total current consumption marks is 49 in the above system configuration, and another power supply module is required in the expansion rack panel.

(3) Calculation of current consumption (by calculating current consumption)

As the calculation example, calculate current consumption taking the system configuration in the example of (2).

JW-33CUH1	0.65A
JW-14PG	0.2A
JW-201N	0.04 × 8 = 0.32A
JW-211NA	0.06 × 8 = 0.48A
JW-203S	0.13 × 8 = 1.04A
JW-212SA	0.06 × 8 = 0.48A
Total	3.17A

The total current consumption is 3.17 A, and another power supply module is not required in the expansion rack panel.

As indicated above, the total current consumption calculation method requires no more power supply module, but the current consumption mark method requires another power supply module. Therefore, get total current consumption using calculation method for determine system configuration. The mark counting method gives only a rough estimate.

7-2 Allocation of the relay number

Relay numbers of input, output, special, and option module are assigned by automatic registration when the power source is turned ON (protect switch: OFF), or by I/O registration (automatic registration/ table creation) of the support tool (corresponding to JW30H). As the assignment, relay points are registered in the control module of JW30H, by the type of the mounting module, in every rack and slot number of the basic and expansion rack panel. When the protect switch of the control module is OFF and the system memory #247 = 0, the relay numbers are assigned automatically when the power source is turned ON. After automatic registration, prohibit automatic registration during operation by turning ON the protect switch or writing #247 = 03_{HEX}.

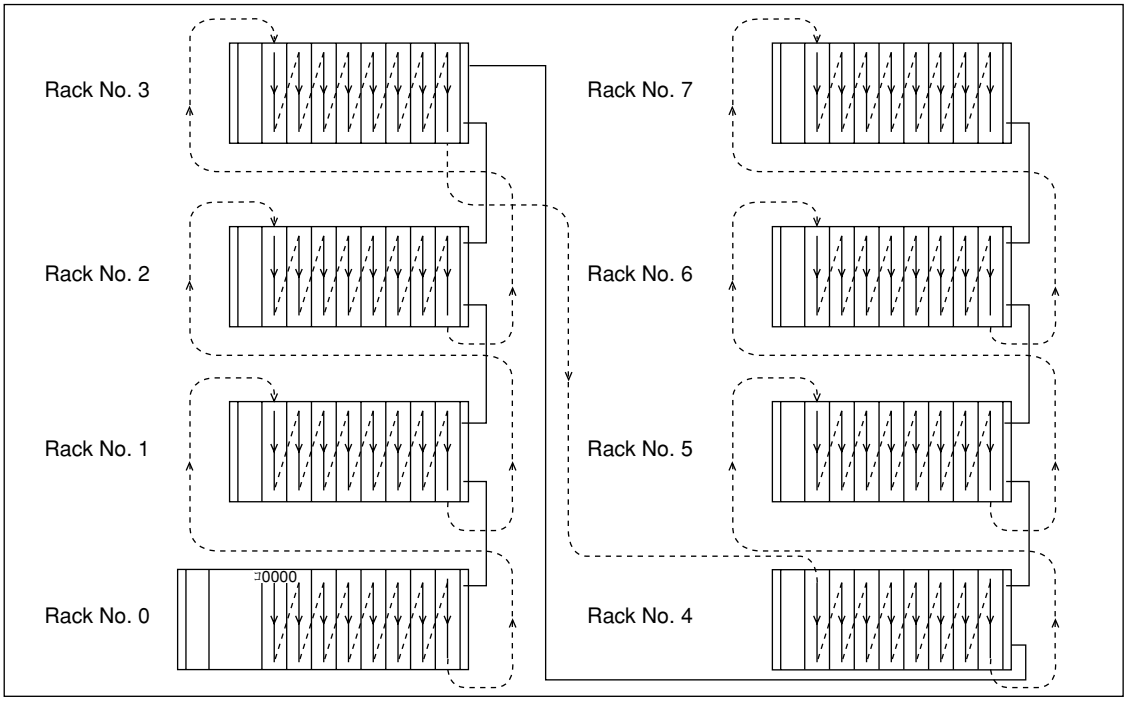
The registered relay number is verified by self-diagnosis when changing the mode of JW30H (starting operation from stopped state). As a result of verification, if different from the mounted module, the fault lamp of the control module lights, and the JW30H stops operation. At the same time, the error code 60 (table verify error) is stored in the system memory #160.

[1] Kinds of I/O registration

I/O registration of JW30H have “Auto registration” and “Table creation.”

(1) Auto registration

Top addresses of rack numbers 0 to 7 are set automatically in the continuous address from ⊐0000.



• Max. number of I/O points and I/O relay area.

Control module	Max. No. of I/O points	I/O relay area
JW-31CUH1	512 points	⊐0000 to ⊐0177
JW-32CUH1	1024 points	⊐0000 to ⊐0277
JW-33CUH1/2/3	3072 points *Note 1	⊐0000 to ⊐0377

*Note 1 :When 32 stations each of the 32-point module and the 64-point module (special I/O module) are mounted, the max. number of I/O points will be 3072. (32 points x 32 sets + 64 points x 32 sets = 3072 points)

However, the relay area for 64-point module uses relay which are for a special I/O module, and occupies 16 points per module.

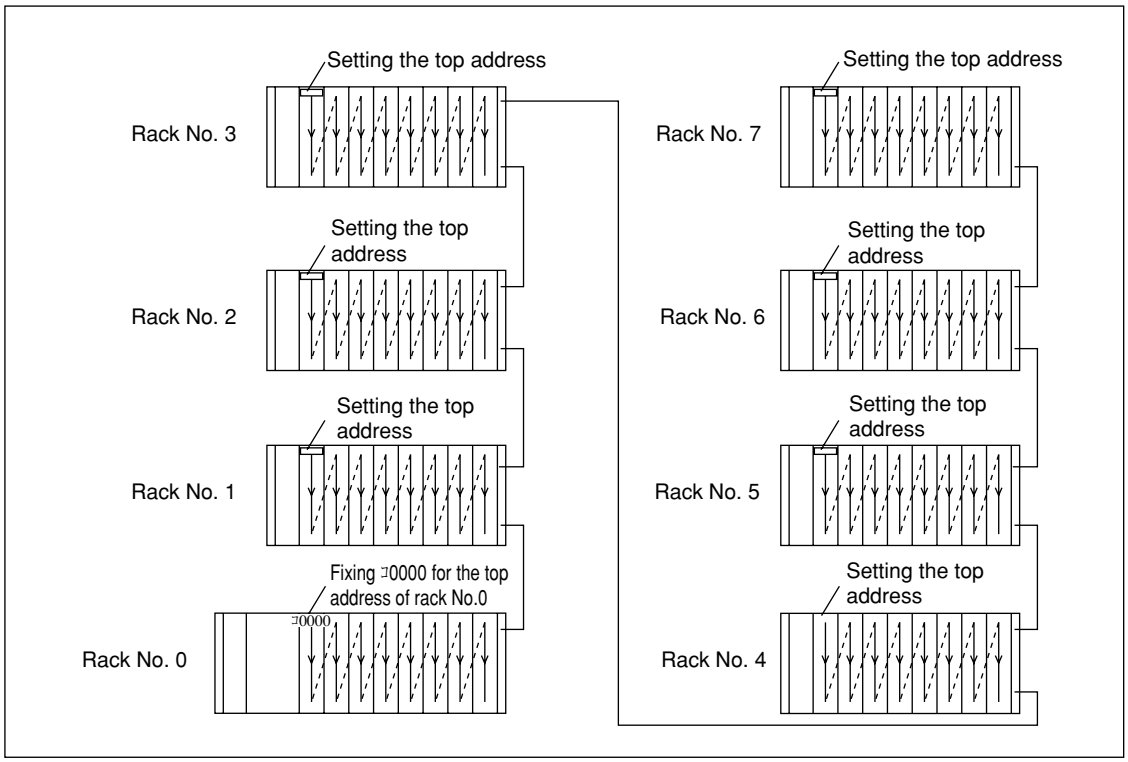
Therefore, the number of occupied I/O relay points in this case is 1536.

(32 points x 32 sets + 16 points x 32 sets = 1536 points) [See “Module installation examples” on page 7-7.]

Note 2: The I/O mounted on the remote I/O slave station JW-21RS is not registered automatically. When the master station is JW-21CM and the slave station is JW-21RS, the I/O registration of slave station is registered in the parameter of JW-21CM.

(2) Table creation

In the expansion rack panel (rack numbers 1 to 7), the top address of relay number is set in even address (within area of ↄ0000 to ↄ1577).



- Don't allow duplicate numbers in the relay number of previous rack and relay number of next rack.
- Max. number of I/O points and I/O relay area.

Control module	Max. No. of I/O points	I/O relay area
JW-31CUH1	512 points	ↄ0000 to ↄ1577
JW-32CUH1	1024 points	
JW-33CUH1/2/3	3072 points *Note	

*Note 1:When 32 stations each of the 32-point module and the 64-point module (special I/O module) are mounted, the max. number of I/O points will be 3072. (32 points x 32 sets + 64 points x 32 sets = 3072 points)

However, the relay area for 64-point module uses relay which are for a special I/O module, and occupies 16 points per module.

Therefore, the number of occupied I/O relay points in this case is 1536.

(32 points x 32 sets + 16 points x 32 sets = 1536 points) [See “Module installation examples” on page 7-7.]

[2] I/O relays allocated to each module

Relay numbers in each rack penel are automatically allocated in series following each rack top address set by I/O register. Number of points and contents of relays allcated varies with kinds of module.

Kinds of module	Allocation No. of points	Contents of allocated relay No.
8 points input/output	16	Instead of 8 points, 16 points are assigned. • The first half 8 points is acceptable for input/output and the second half 8 points is unacceptable area for this module.
16 points input/output	16	Acceptable for 16 points as I/O module.
32 points input/output ／ I/O	32	Acceptable for 32 points as input, output, and I/O module.
Special I/O (64 points input/output)	16	Although 16 points are assigned, this is a dummy area not used in this module. • In the 64 points I/O module, the relay area for special I/O module can be used as I/O module.
Special I/O (except for 64 points)	16	Although 16 points are assigned, this is a dummy area not used in this module.
I/O link master station		
Option		
Vacant slot	16	Allocation for 16 points.

[3] Maximum number of input/output points and allocation of input/output relays

Each control module has own maximum number of control input/output points. However, number of relay points that affect maximum number of control input/output points varies with each model. Be careful that these are different from number of relay allocation points.

■ **Maximum number of control input/output points**

Control module model name	Maximum number of control I/O points	Maximum number of I/O relay allocation points	I/O relay area	
			Automatic registration	Create table
JW-31CUH1	512 points	1280 points	⊐000 to ⊐0237	⊐0000 to ⊐1577
JW-32CUH1	1024 points	1536 points	⊐000 to ⊐0237	
JW-33CUH1/2/3	3072 points	2048 points	⊐000 to ⊐0237	

■ **Number of relay points and number of installable modules on each module**

Module type		Number of relay points that affect maximum number of control I/O points	Number of allocation points of I/O relays	Maximum number of installed modules	Racks that can install
8 point input/output modules		16 points	16 points	64 modules	Rack 0 to 7
16 point input/output modules		16 points	16 points	64 modules	Rack 0 to 7
32 point input/output/ I/O modules		32 points	32 points	64 modules	Rack 0 to 7
Special I/O module	64 point input/outut	64 points*	16 points	32 modules	Rack 0 to 3
	Other than 64 point input/output	0	16 points		
I/O link master module		0	16 points	4 modules	Rack 0
Option module		0	16 points	7 modules	Rack 0
Vacant slot		0	16 points	---	Rack 0 to 7

* The 64-point input/output module uses special I/O relay area (⊐3000 to ⊐3777) for its control relay.

■ **Module installation examples**

Control module model name	Maximum number of modules installed				Number of control I/O points	Number of I/O relay allocation points
	8-point, 16-point input/output modules	32-point input/output/ I/O modules	Special I/O module (64-point input/output)	Number modules can be installed other than the left (including vacant slots) Numbers in [ ] are special I/O modules		
JW-31CUH1	32 modules	0	0	32 modules [32 modules]	512 points (16 points x 32)	1024 points (16 p x 32 + 16 p x 32)
	0	16 modules	0	48 modules [32 modules]	512 points (32 points x 16)	1280 points (32 p x 16 + 16 p x 48)
	0	0	8 modules	56 modules [24 modules]	512 points (64 points x 8)	1024 points (16 p x 8 + 16 p x 56)
JW-32CUH1	64 modules	0	0	0	1024 points (16 points x 64)	1024 points (16 p x 64)
	0	32 modules	0	32 modules [0]	1024 points (32 points x 32)	1536 points (32 p x 32 + 16 p x 32)
	0	0	16 modules	48 modules [16 modules]	1024 points (64 points x 16)	1024 points (16 p x 16 + 16 p x 48)
JW-33CUH1 JW-33CUH2 JW-33CUH3	64 modules	0	0	0	1024 points (16 points x 64)	1024 points (16 p x 64)
	0	64 modules	0	0	2048 points (32 points x 64)	2048 points (32 p x 64)
	0	0	32 modules	32 modules [0]	2048 points (64 points x 32)	1024 points (16 p x 32 + 16 p x 32)
	0	32 modules	32 modules	0	3072 points (32 p x 32 +64 p x 32)	1563 points (32 p x 32 + 16 p x 32)

Numbers above are true when one JW-38KB basic rack panel (8 slots) and 7 sets of JW-38ZB expansion rack panels (8 slots) are used. (Total = 8 slots x 8 racks= 64 modules)

[4] Operation method of I/O module registration using support tool.

Using next support tool (correspond to JW30H), I/O module registration is possible by menu operation. See instruction manual of respective model for operation method.

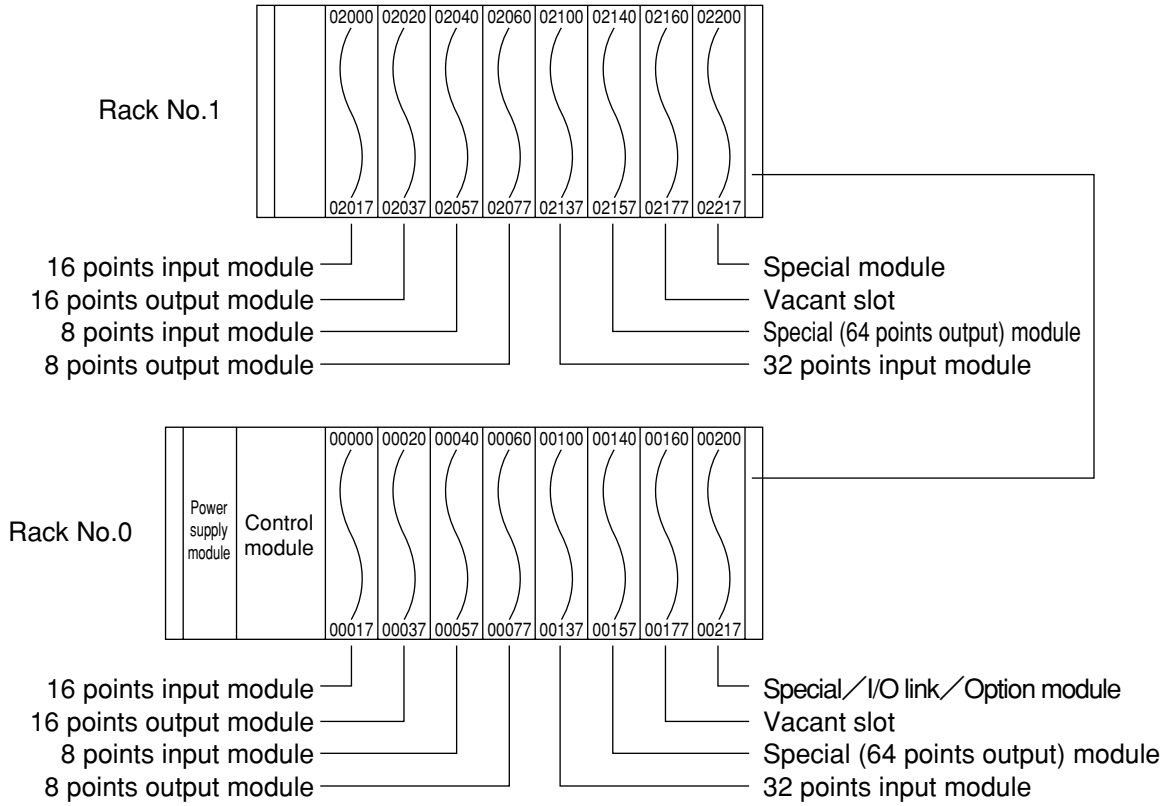
[Support tool correspond to the JW30H]

- JW-14PG
- JW-13PG (with B mark)
- JW-50PG (Ver. 5.5 or more)
- JW-100SP
- JW-50SP (Ver. 5.5l or more)
- JW-92SP (Ver. 5.5 or more)
- JW-52SP (Ver. 5.5 or more)

[5] Allocation example of relay no.

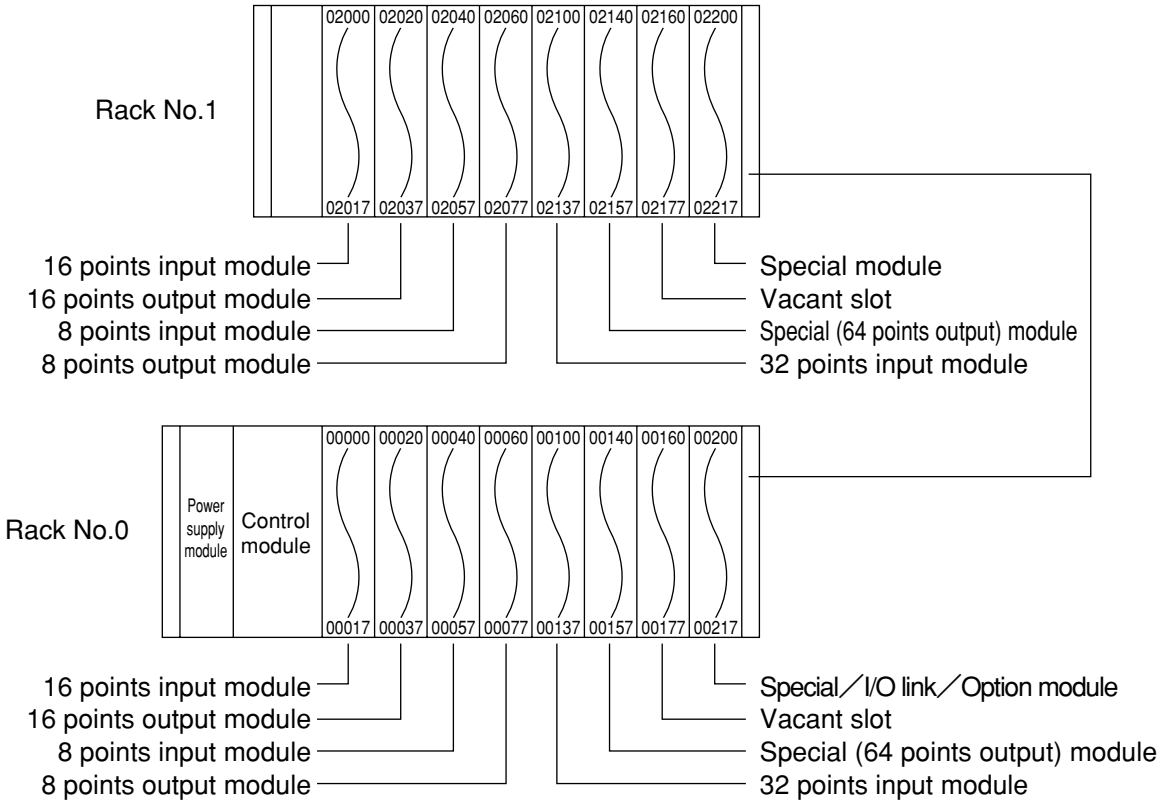
(1) Example of auto registration

This is to show the relay numbers in the following system configuration.


Rack No.1
02000 02020 02040 02060 02100 02140 02160 02200
02017 02037 02057 02077 02137 02157 02177 02217
16 points input module
16 points output module
8 points input module
8 points output module
Special module
Vacant slot
Special (64 points output) module
32 points input module
Rack No.0
Power supply module
Control module
00000 00020 00040 00060 00100 00140 00160 00200
00017 00037 00057 00077 00137 00157 00177 00217
16 points input module
16 points output module
8 points input module
8 points output module
Special／I/O link／Option module
Vacant slot
Special (64 points output) module
32 points input module

(2) Example of table creation

This is to show the relay numbers when the top address of rack number 1 is set at □0200 in the following system configuration.


Rack No.1
02000 02020 02040 02060 02100 02140 02160 02200
02017 02037 02057 02077 02137 02157 02177 02217
16 points input module
16 points output module
8 points input module
8 points output module
Special module
Vacant slot
Special (64 points output) module
32 points input module
Rack No.0
Power supply module
Control module
00000 00020 00040 00060 00100 00140 00160 00200
00017 00037 00057 00077 00137 00157 00177 00217
16 points input module
16 points output module
8 points input module
8 points output module
Special／I/O link／Option module
Vacant slot
Special (64 points output) module
32 points input module

7-3 Data memory for special I/O, I/O link, and option module

Data memory for special I/O, I/O link, option module is set by module No. switch of module face as follows:

	Module name	Model name	Module No. switch	Byte address	Flag area	No. of installation
Special I/O module	64 points input	JW-264N	Refer to the next page			Max. 32 sets in one system (one control module). Note: Further 8 sets can be extended by using remote I/O slave station.
	64 points output	JW-262S				
	Analog input	JW-24AD				
	Analog output	JW-22DA				
	High speed counter	JW-21HC/22HC				
	Serial interface	JW-21SU				
	ID control	JW-21DU/22DU				
	Pulse output	JW-21PS				
I/O link	I/O link master station	JW-23LMH	SW0	ㅋ2000 to ㅋ2077	ㅋ1570,ㅋ1571	Max. 4 sets only on basic rack panel.
			SW1	ㅋ2100 to ㅋ2177	ㅋ1572,ㅋ1573	
			SW2	ㅋ2200 to ㅋ2277	ㅋ1574,ㅋ1575	
			SW3	ㅋ2300 to ㅋ2377	ㅋ1576,ㅋ1577	
Option module	Link	JW-21CM	SW0	ㅋ1000 to ㅋ1077	ㅋ1500 to ㅋ1507	Max. 7 sets only on basic rack panel.
			SW1	ㅋ1100 to ㅋ1177	ㅋ1510 to ㅋ1517	
			SW2	ㅋ1200 to ㅋ1277	ㅋ1520 to ㅋ1527	
			SW3	ㅋ1300 to ㅋ1377	ㅋ1530 to ㅋ1537	
			SW4	ㅋ1400 to ㅋ1477	ㅋ1540 to ㅋ1547	
			SW5	89000 to 89077	ㅋ1550 to ㅋ1557	
			SW6	———	ㅋ1560 to ㅋ1567	
	JW10 link	JW-25CM	SW0	ㅋ1000 to ㅋ1477	ㅋ1500 to ㅋ1502	
			SW1	ㅋ1300 to ㅋ1477	ㅋ1510 to ㅋ1511	
			SW2	59000 to 69757	ㅋ1520 to ㅋ1527	
			SW3	69000 to 79757	ㅋ1530 to ㅋ1537	
			SW4	79000 to 89575	ㅋ1540 to ㅋ1547	
			SW5	89000 to 99757	ㅋ1550 to ㅋ1557	
			SW6	ㅋ2000 to ㅋ3757	ㅋ1560 to ㅋ1567	
	Net work	JW-22CM	The area set by module No. switch differs the standard function from memory-saving function.			
	ME-NET	JW-21MN				
	Ethernet	JW-255CM	---			
	FL-net	JW-20FL5	Assign option parameter use area (SW0 to SW6) using module No. switch setting.			
		JW-20FLT				
	DeviceNet master	JW-20DN	Assign I/O data, diagnostic data, and host Explicit message data using module No. switch setting.			

Note: Special I/O module can only be mounted on racks 0 to 3. (It can not be mounted on racks 4 to 7.)

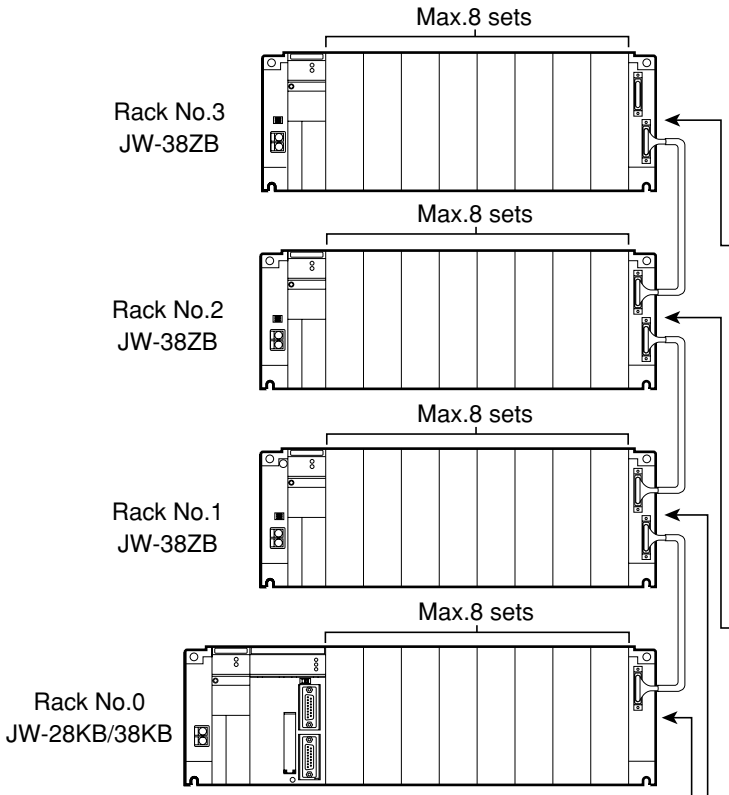
When using the 64 points I/O module, the number of mountable sets varies with the model of the control module.

Model name	Total amount of 64 points module	Max. No. of I/O points
JW-31CUH1	Max. 8 sets	512 points
JW-32CUH1	Max. 16 sets	1024 points
JW-33CUH1/2/3	Max. 32 sets	3072 points

■ **Data memory for special I/O module**

(1) In case of basic system

Data memory is setting by module No. switch in each rack.



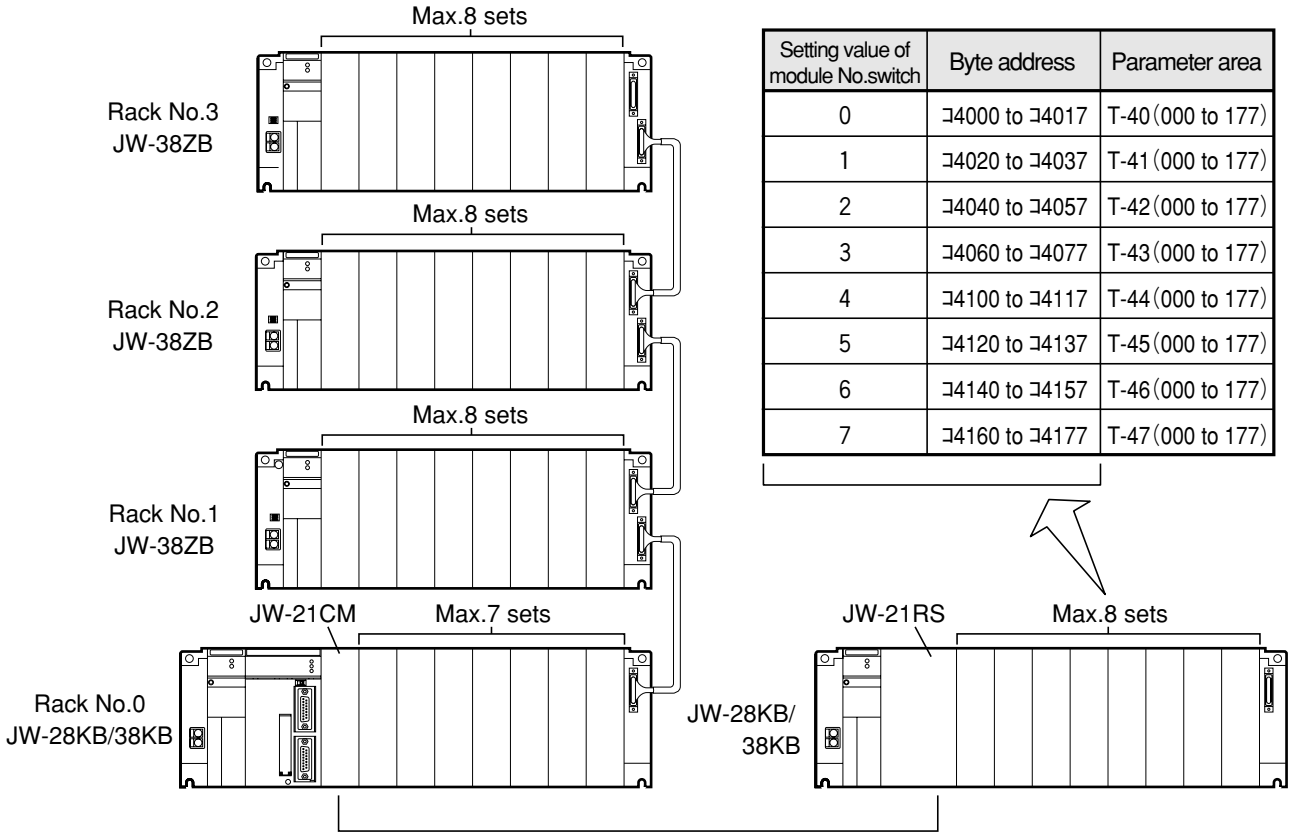
Setting value of module No.switch		Byte address	Parameter area
Rack 3	0	ㅋ3600 to ㅋ3617	T-30(000 to 177)
	1	ㅋ3620 to ㅋ3637	T-31(000 to 177)
	2	ㅋ3640 to ㅋ3657	T-32(000 to 177)
	3	ㅋ3660 to ㅋ3677	T-33(000 to 177)
	4	ㅋ3700 to ㅋ3717	T-34(000 to 177)
	5	ㅋ3720 to ㅋ3737	T-35(000 to 177)
	6	ㅋ3740 to ㅋ3757	T-36(000 to 177)
	7	ㅋ3760 to ㅋ3777	T-37(000 to 177)
Rack 2	0	ㅋ3400 to ㅋ3417	T-20(000 to 177)
	1	ㅋ3420 to ㅋ3437	T-21(000 to 177)
	2	ㅋ3440 to ㅋ3457	T-22(000 to 177)
	3	ㅋ3460 to ㅋ3477	T-23(000 to 177)
	4	ㅋ3500 to ㅋ3517	T-24(000 to 177)
	5	ㅋ3520 to ㅋ3537	T-25(000 to 177)
	6	ㅋ3540 to ㅋ3557	T-26(000 to 177)
	7	ㅋ3560 to ㅋ3577	T-27(000 to 177)
Rack 1	0	ㅋ3200 to ㅋ3217	T-10(000 to 177)
	1	ㅋ3220 to ㅋ3237	T-11(000 to 177)
	2	ㅋ3240 to ㅋ3257	T-12(000 to 177)
	3	ㅋ3260 to ㅋ3277	T-13(000 to 177)
	4	ㅋ3300 to ㅋ3317	T-14(000 to 177)
	5	ㅋ3320 to ㅋ3337	T-15(000 to 177)
	6	ㅋ3340 to ㅋ3357	T-16(000 to 177)
	7	ㅋ3360 to ㅋ3377	T-17(000 to 177)
Rack 0	0	ㅋ3000 to ㅋ3017	T-00(000 to 177)
	1	ㅋ3020 to ㅋ3037	T-01(000 to 177)
	2	ㅋ3040 to ㅋ3057	T-02(000 to 177)
	3	ㅋ3060 to ㅋ3077	T-03(000 to 177)
	4	ㅋ3100 to ㅋ3117	T-04(000 to 177)
	5	ㅋ3120 to ㅋ3137	T-05(000 to 177)
	6	ㅋ3140 to ㅋ3157	T-06(000 to 177)
	7	ㅋ3160 to ㅋ3177	T-07(000 to 177)

- Do not use the second half 8 bytes of byte address for JW-264N/262S(For example, ㅋ3610 to ㅋ3617)in 64 points input/output. This area can use as auxiliary relay.

- Do not use paramater for JW-264N/262S, and JW-21DU/22DU.

(2) In case of basic system plus remote I/O system

Up to 8 sets are set in the remote I/O slave station by module No. switch.



Setting value of module No.switch	Byte address	Parameter area
0	ㅋ4000 to ㅋ4017	T-40(000 to 177)
1	ㅋ4020 to ㅋ4037	T-41(000 to 177)
2	ㅋ4040 to ㅋ4057	T-42(000 to 177)
3	ㅋ4060 to ㅋ4077	T-43(000 to 177)
4	ㅋ4100 to ㅋ4117	T-44(000 to 177)
5	ㅋ4120 to ㅋ4137	T-45(000 to 177)
6	ㅋ4140 to ㅋ4157	T-46(000 to 177)
7	ㅋ4160 to ㅋ4177	T-47(000 to 177)

- The data memory/parameter area of racks 0 to 3 is same as in the basic system (previous page).
- When the JW-21CM is the master station, up to 4 sets of JW-21RS can be connected, but special I/O module can be connected by 8 sets at maximum in the total of slave station, and if the slave station are different, duplicate module No. switches are not permitted.
- When others than JW-21CM are master station and JW-21RS is a slave station, special I/O module cannot be installed in the slave station.
- The serial interface module JW-21SU cannot be used in the remote I/O slave station. Meanwhile, if the ID control module JW-21DU/22DU or pulse output module JW-21PS is used in the remote I/O slave station, the method of use is limited partly. (The F-85 and F-86 instructions cannot be used.)

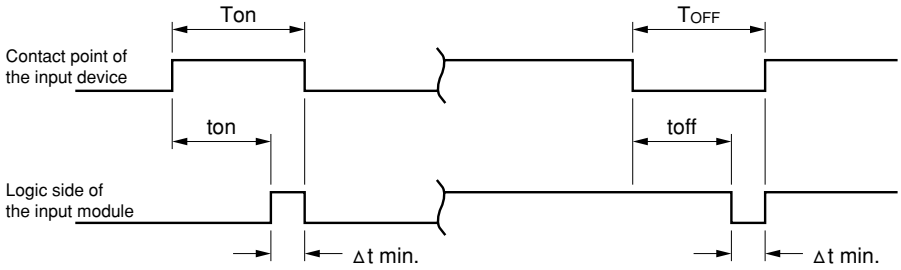
7-4 Precautions for operating I/O module

[1] Precautions for operating input module

(1) ON/OFF time of the input signal

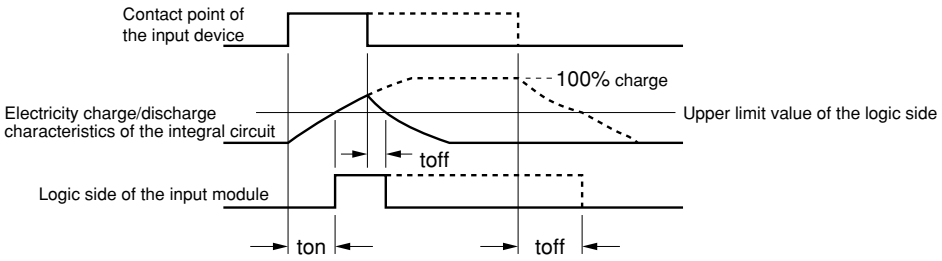
In order to ensure ON/OFF condition of the input device correctly (limit switch etc.) on the operation of the JW30H, ON or OFF time should meet the following conditions.

ON time of the input device (T_{ON})	$T_{on} > \Delta t + t_{on}$
OFF time of the input device (T_{OFF})	$T_{off} > \Delta t + t_{off}$
	Δt ···· One scanning time of PC
	t_{on} ····· OFF to ON response time of the input module
	t_{off} ····· ON to OFF response time of the input module



In the input/output process at the beginning of each scanning cycle, ON/OFF state of the logic side of the input module is written in the data memory and used as input data for operation of the user's program within its scanning cycle. Therefore, if ON or OFF time of the logic side of the input module is less than 1 scanning time (Δt), ON/OFF data may not be included in the data memory.

Note: The response time of the input module is made by the electricity charge/discharge characteristics of the integral circuit of the input module, and it varies depending on the time of duration of ON or OFF.



toff shows the difference, shown in the above, between the case when the ON time of the contact point of the input device is longer as shown by dotted lines and the case when the ON time is shorter as shown by solid line.

(Calculation example in case the JW-214N is used as an input module)

If 1 scanning time is 5ms,

$T_{on} > \Delta t + t_{on} = 5 + 0.5 = 5.5$ (ms)

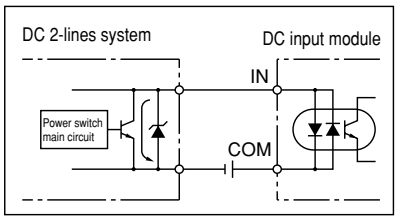
$T_{off} > \Delta t + t_{off} = 5 + 1.5 = 6.5$ (ms)

(2) Connectable input device

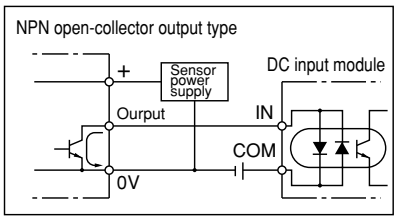
The followings are sensors and switches which can be connected as input. See below for selection and connection of the input device.

- **DC input device**

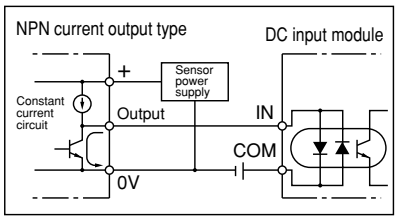
①



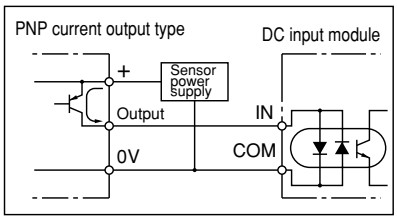
②



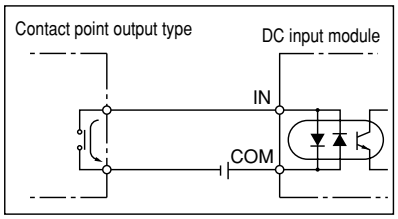
③



④

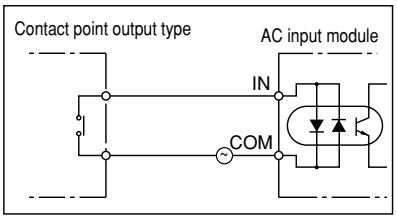


⑤

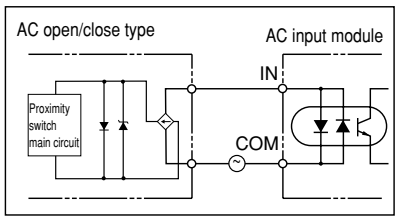


- **AC input device**

⑥

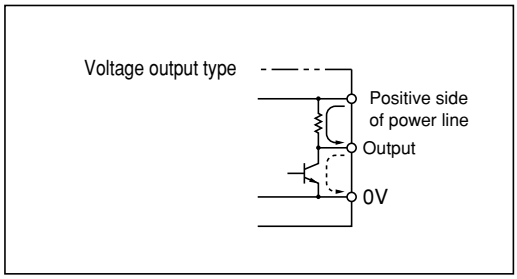


⑦



In cases of ①, ②, ③, ④, and ⑤, use a transister having current driving capacity lager than that of the constant input current of the DC input module.
In cases of ① and ⑦, pay attention to leakage current at OFF. (When leakage current is higher than the OFF input current level of the input module, the proximity switch may not turn OFF.)

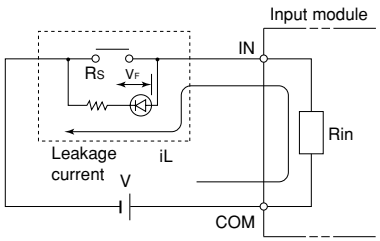
Be careful that voltage output type DC inout device shown in the right may not be connected. (Driving capacity of an output transistor should be higher than the ON level of the input module).



(3) Countermeasure leakage current on input device

In the following device, there is also leakage current at OFF. If the leakage current is higher than the OFF level of the input module, the input module may not turn OFF, or noise margin at OFF state may drop.

① Limit switch with LED



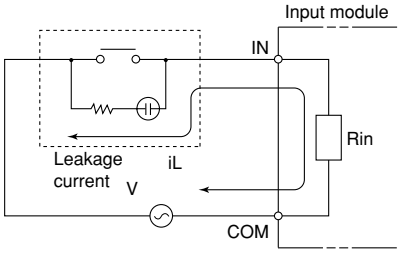
Reference

Calculation of leakage current i_L

$$i_L = \frac{V - V_F}{R_s + R_{in}}$$

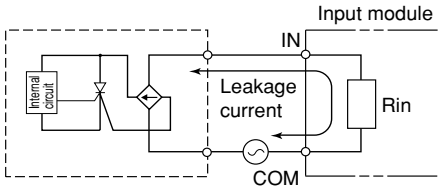
V: Power supply voltage
V_F: Voltage drop in the forward direction of LED
R_S: Current limit resistance
R_{in}: Input impedance of input module

② Limit switch with neon lamp (the neon lamp is connected in parallel with the contact point.)



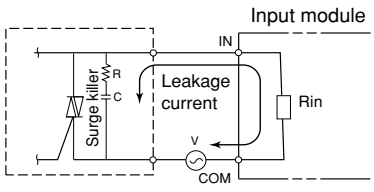
③ Proximity and photo switches of AC two lines system

In the AC two lines system, even at OFF there is leakage current from current consumption of the internal circuit, and this might prevent the input module from falling in the OFF state. This is nominated as “leakage current” in the specifications of photo switches etc. Make sure that this value is less than the OFF level of the input module.



④ Built-in triac, thyrister and contact point output of surge killers

Some device has CR device as a surge killer for the purpose of avoiding the check mistakes of triac and thyrister, and the leakage current of this CR may prevent the input module from falling in the OFF state. In such a case, the best remedy is to remove the CR. If this is not possible, use the C value of the CR of less than 0.033 μF for 100 VAC; and that of less than 0.015 μF, for 200 VAC.



Reference

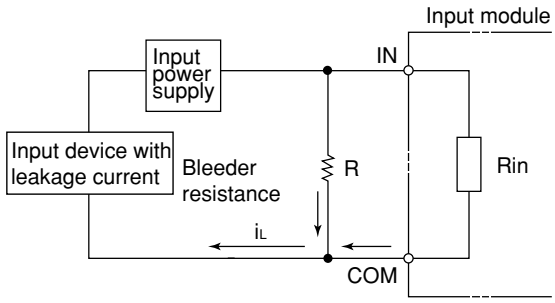
Calculation of leakage current i_L

$$i_L = \frac{V}{2\pi fc}$$

V: Power supply voltage
f: Power frequency (50/60Hz)
C: Capacitor

Countermeasure: Connection of bleeder resistance

As a countermeasure, a bleeder resistance can be inserted in the input side of the input module as shown below.



Choose the bleeder resistance value R to meet the following conditions:

$$i_L = \left(\frac{R_{in} \times R}{R_{in} + R} \right) < V_{in\ OFF}$$

Composite impedance of the bleeder resistance and the input impedance

$$R < \left(\frac{V_{in\ OFF} \times R_{in}}{R_{in} \times i_L - V_{in\ OFF}} \right) \times \underset{\text{Margin}}{0.5}$$

i_L: Current leakage of the input device
$V_{in\ OFF}$: Input of the input module OFF level voltage
R_{in}: Input impedance of the input module
V: Input power supply voltage

In this case, the rating electric power W is,

$$W > \frac{V^2}{R} \times \underset{\text{Margin}}{3}$$

[Example] In case that the JW-212N is used as an input module at the input power supply voltage of 24 V, and that the leakage current of the input device is 5 mA,

i_L = 5 mA
$V_{in\ OFF}$ = 5 V
R_{in} = 3.3 k ohm
V = 24 V

$$R < \frac{5 \times 3.3}{3.3 \times 5 - 5} \times 0.5 = 0.78 \text{k ohm}$$

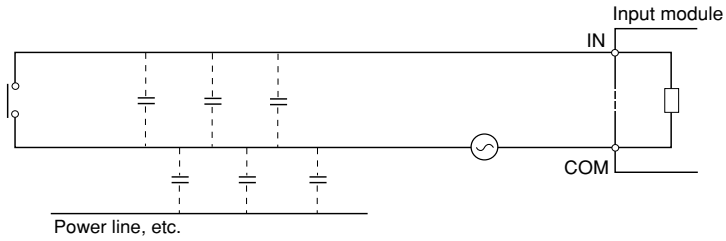
If R is 0.78 k ohm,

$$W > \frac{24^2}{0.78 \times 10^3} \times 3 = 2.22 \text{ W}$$

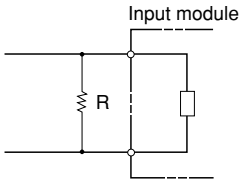
W will be 2.3 W.

(4) Notes for long-distance wiring and by-pass wiring

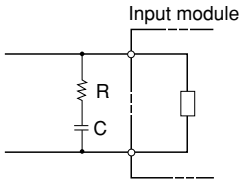
In the AC input module, when the cables to external device are very long or wiring along with power lines is made, the input module might be turned ON in spite of the OFF command in the input device, due to leakage current and inducement by floating capacity among cables.



Countermeasure 1: Connect a bleeder resistance and a CR surge killer in parallel with the input module to reduce the composite impedance of the input module.



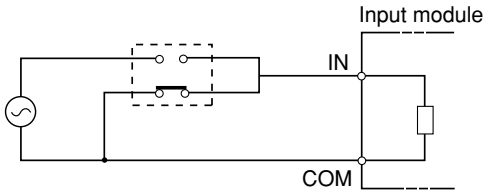
The smaller the R value, the more effective. However, when R becomes small, power consumption ($\frac{V^2}{R}$) increases. Therefore, note the R's watt value.



C: 0.033 to 0.33μF
(Pressure resistance of over 250 VAC)
R: 47 to 120 ohm

Countermeasure 2: Change the input power supply to DC (Use DC input module)
In general, the direct current signals are little affected by floating capacity and inducement.

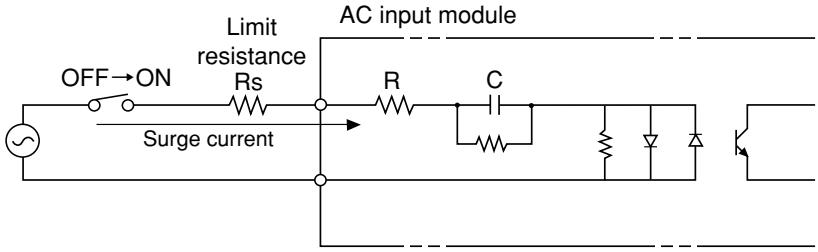
Countermeasure 3: Close circuit by making use of the b contact.
When the b contact is used to make a close circuit at OFF, very little induced voltage is generated.



Note: Do not wire the input signal line near and in parallel with power lines of a motor and an inverter.

(5) Surge current of the AC input module

There is surge current in the AC input module: JW-201N/203N/211NA, when turning ON the input. The surge current of the AC input module is determined by constants (R, C) of the input circuit inside the module, power supply voltage at ON input, phase, power supply current capacity and wiring impedance. The surge current stated in the AC input module specifications is the worst value for the case of the ON input at the maximum impressed voltage and at the peak phase.
If, in certain input device, contact points are affected (adhered etc.) by the surge current, the surge current should be reduced by connecting a limit resistance Rs outside the module as shown below.



The following limit resistances Rs can be connected outside the module:
For 100 VAC input module, less than 2 k ohm (over 2 W rate electricity)
For 200 VAC input module, less than 4 k ohm (over 2 W rate electricity)

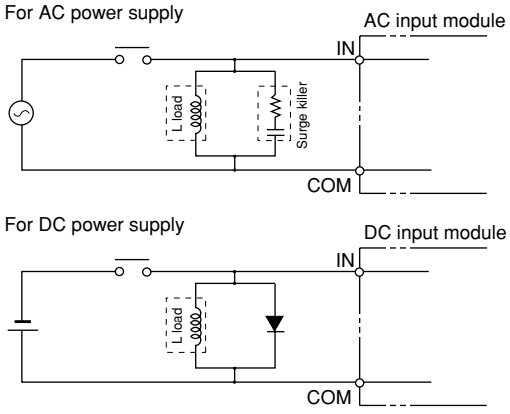
Reference

- When a limit resistance of 2 k ohm (or 4 k ohm) is connected for the 100 VAC (or 200 VAC) input module, the surge current becomes less than 80 mA at the peak ON.

Note: If a resistance bigger than the above value is connected, the input ON/OFF levels and the response times cannot be guaranteed.

(6) Countermeasure in case of connection of induced load to input signal

If the induced load is connected to the input signal, in order to absorb the noise, connect a surge killer near the load for the AC circuit; and a diode, for the DC circuit, as shown below.



Surge killer: R, C
C: 0.033 to 0.33 μF
(Resistance voltage of over 250 VAC)
R: 47 to 120 ohm

Diode:

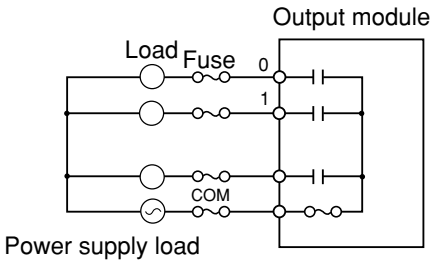
Peak inverse voltage (V_{RM}) should be more than 3 times bigger than the load voltage, and the average rectification current should be bigger than load current.

[2] Precautions for operating the output module

(1) Protection from output short circuit

In case of a short circuit of the load connected to an output terminal, output devices and print board may be burned. Be sure to insert a protection fuse in the output.

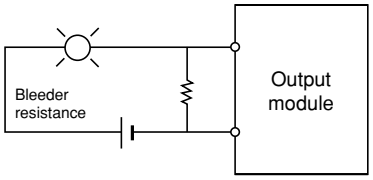
Some modules have a built-in fuse per common line for protection of the module from heating and burning due to excessive current. It is not intended, however, for protection of the output devices and load from excessive current; therefore, insert fuse for each line outside the module. This is also advisable from maintenance point of view.



(2) Countermeasure to surge current of lamp load

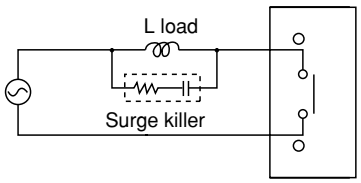
At turning ON an incandescent lamp, there is surge current 10 to 20 times bigger than normal current for several 10ms. For reduction of the surge current, insert either a bleeder resistance or an electric current limit resistance.

① To insert a bleeder resistance



During the OFF state of the output module, keep supplying dark current so small as to turn on the lamp dimly.

② To insert an electric current limit resistance

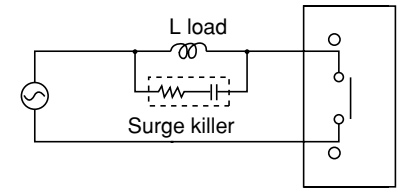


This limits the current within a value determined by the value of the current limit resistance. When the resistance value is high, the voltage on the lamp decreases. Determine the resistance value by the brightness needed when turning ON the lamp.

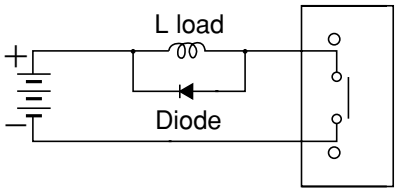
(3) Countermeasure to surge voltage at opening/closing induced load

Some load generates surge voltage of several thousands volt when an induced load is operated or closed its circuit. All output module except the relay output module have a circuit to absorb surge within module. However, when the wiring to the load is long, its effectiveness is reduced and a surge countermeasure is required in the load side as well. In case of the relay output module without surge absorption circuit, surge countermeasure outside the module is indispensable in case the load generates high voltage. (This surge voltage countermeasure can extend the life time of the contact points of the relay.)

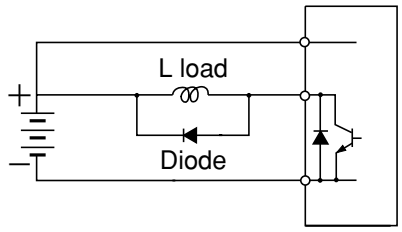
Surge voltage countermeasure



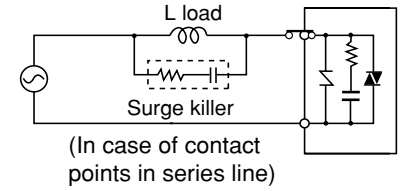
Relay output module



Relay output module



Transistor output module, FET output module



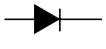
Triac output module

CR surge killer:

C: 0.033 to 0.33 μF (Pressure resistance of over 250 VAC)
R: 47 to 120 ohm

Example of CR surge killer

For 100 VAC	953M2503 10411(0.1 μ + 120 ohm) (made by Matsuo Electric Co., Ltd.)
For 200 VAC	953M5003 33311(0.033 μ + 120 ohm) (made by Matsuo Electric Co.,Ltd.)

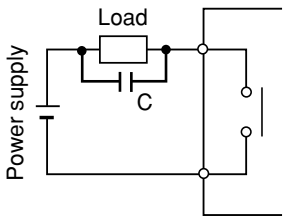
Diode: 

Peak inverse voltage (V_{RM}) is more than three times of the load voltage.
Average rectified current (Io) is more than load current.

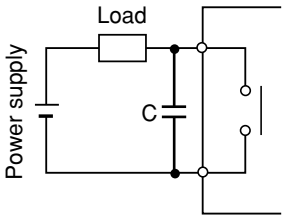
In case of AC load, a varistor can be used in place of the CR surge killer for the same effect. (Installation of both of the CR surge killer and the varistor increases the effect.)

For 85 to 132 VAC	TNR12G221K (made by Marcon Co., Ltd.), NV220D14 (made by NEC)
For 170 to 264 VAC	TNR12G431K (made by Marcon Co., Ltd.), NV430D14 (made by NEC)

Note 1: Avoid the use of a capacitor only as an arc killer, as shown below:

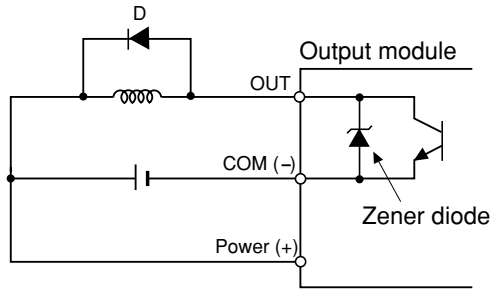


Though a capacitor is very effective for the arc deletion at shut-off. But charged current to the capacitor may melt the contact point at turning ON a contact point.



Though a capacitor is very effective for the arc deletion at shut-off. But at the opening of the circuit of a contact point, electricity is accumulated at the capacitor. Therefore, the short circuit current of the capacitor may melt the contact point at turning ON the contact.

Note 2: DC output module JW-202S uses a zener diode as a surge absorber within the module. In case of using an induced load of large load current such as solenoid valves, note the followings:



D: Diode for counter surge voltage absorption at OFF

When the load current is an induced load of over 0.3 A, use the module with the open/close frequency at less than 30 times/min. (1 sec. ON/1 sec. OFF or so). When more frequent opening/closing, a surge countermeasure for counter voltage absorption is needed in the load side. When the load current is an induced load of over 0.5 A, a surge countermeasure for counter surge voltage absorption is indispensable in the load side.

(4) Load which can be driven by the AC output module

The AC output module with SSR as an output device JW-203S/213SA can drive directly the loads of electro-magnetic switches, solenoid valves and lamps. In such cases note the surge current at turning ON (from OFF to ON) and the maintenance current during the maintenance state (ON state). Concretely, use the module within the following range:

Model	Range of Load Voltage	At turning ON	During maintenance state	
		Repeated allowable surge current	Minimum action current	Maximum rated load current
JW-203S	15 to 250 VAC	8A (100 ms)	30 mA	1A/point, 4A/common
JW-213SA		6A (100 ms)	15 mA	1A/point, 2A/common

When the AC output module drives the load, note the surge current at turning ON and the holding current during the maintenance state. Keep the surge current below the repeated allowed surge current at the turning ON; and keep the maintenance current, over the minimum action current and below the maximum rated load current during the maintenance state.

The repeated allowable surge current is a value in case of the pulse width below 100 ms and repeated switching frequency below 20 times/minute. When, in case of the load of a motor, the pulse width of the surge current is large and that the switching frequency is high, keep the ON time of 1 pulse below 50%.

(When the repeated surge current is below the maximum rated load current, there is no limit in the pulse width or in the switching frequency.)

When many loads with big surge current are driven within a same common line circuit, make the number of points which turn from OFF to ON at the same time minimum. When a strong surge current goes through a built-in fuse in a common unit, the built-in fuse may be damaged or fused. The number of the surge current per common which can be turned from OFF to ON at the same time is determined by a fusing property of the built-in fuse as follows (as a guidance):

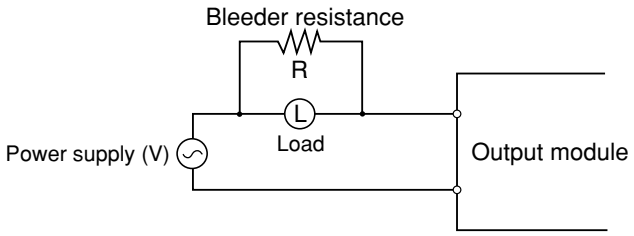
Below 15A (50ms)/JW-203S, Below 10A (100ms)/JW-203SA

Below 10A (50ms)/JW-213S, Below 7A (100ms)/JW-213SA

The numbers in ( ) are pulse widths.

For a light load of the holding current which is smaller than the minimum action current, some characteristics of load may prevent turning OFF. In such a case, connect a bleeder resistance in parallel with the load to increase the maintenance current up to the minimum action current or more.

Some electro-magnetic switches of the pulse-driven cannot be turned OFF even if the holding current is over the minimum action current. In such a case, also, connect a bleeder resistance in parallel with the load. (Select a value of the bleeder resistance so that it can allow the minimum action current by itself.)



Calculate the value R of the bleeder resistance in the following formula:

$$R < \frac{V}{I}$$

V: Power supply voltage
I: Minimum action current of the output module

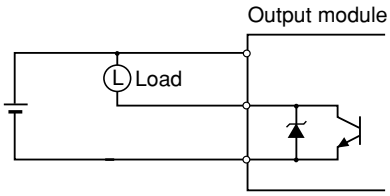
Then, the capacity of R (W) is

$$W > \frac{V^2}{R} \times 3$$

Margin

(5) OFF delay time when the DC output module drives the induced load

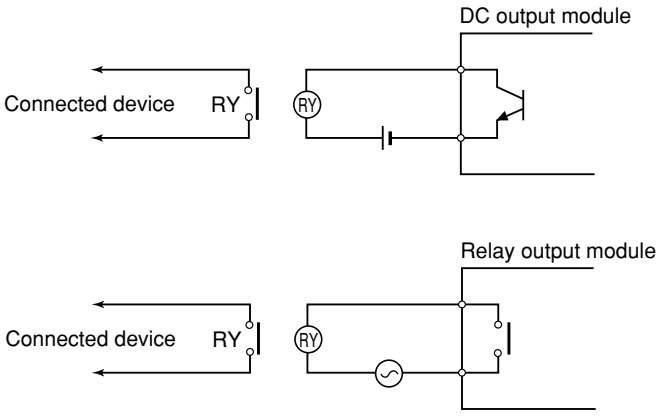
When the DC output module with a built-in cramp diode is used as a surge killer to drive the induced load of direct current such as electro-magnetic valves and solenoid valves, it may be impossible to complete high-speed switching due to the delay of response, since electric current goes to the load through the cramp diode. In such a case, the DC output module with a built-in zener diode, instead of the cramp diode, could speed up the response.



DC output module with a built-in zener diode
JW-202S
JW-212S

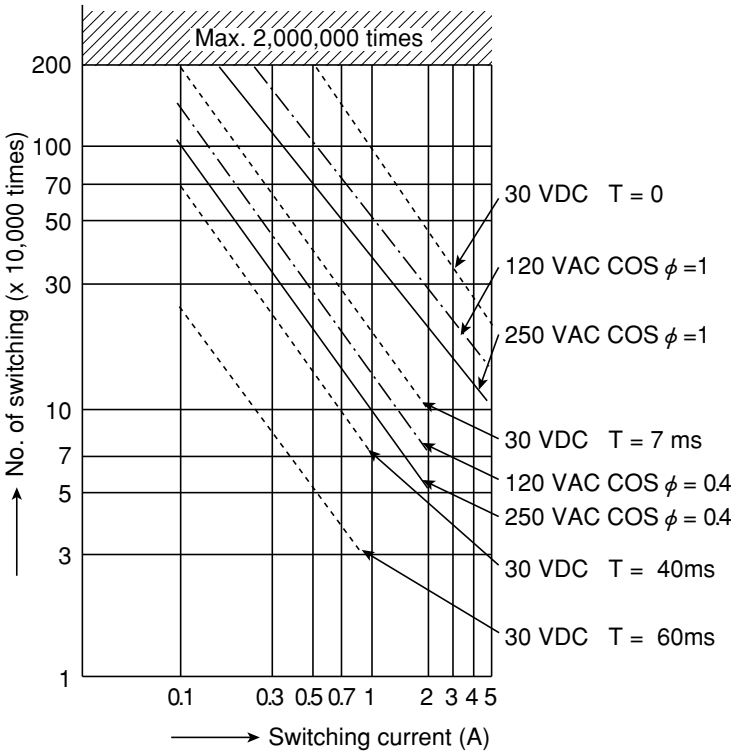
(6) When miniature load is driven by a relay output

The relay used in the relay output module is suitable for power drive, and so with a low voltage and small current such as 24 VDC and 10mA, the contact reliability of the contact point drops. In such a case, we recommend to use a DC output module (transistor output). When connection with a low voltage and small current contact point output cannot be avoided, the following connection should be made: A miniature relay with a reliable contact point under low voltage and small current is driven, and the contact is made at that contact point.



(7) Life of relays of the relay output module

The relay's life of the module (JW-204S/214SA), which uses a relay in output circuit, varies depending on the kind of loads (difference of the power rate of the signal on the contact point is AC or DC and its current value). The following shows characteristic curves of the relay contact point.



Note 1: The above chart shows standard values.
Depending on the environment of usage (ambient temperature and humidity), different life may result.

Note 2: When the signal to the contact point is DC, the life of relays varies according to the load rise characteristics (time constant: T) of the load. The load rise characteristics of the load after the contact point is turned ON are determined by inductance: L and resistance: R

$$\left(T = \frac{R}{L} \right)$$

For the time constant of the load used, see below:

In case of resistance load: T < 1ms

In case of small size relay: T =7 ms

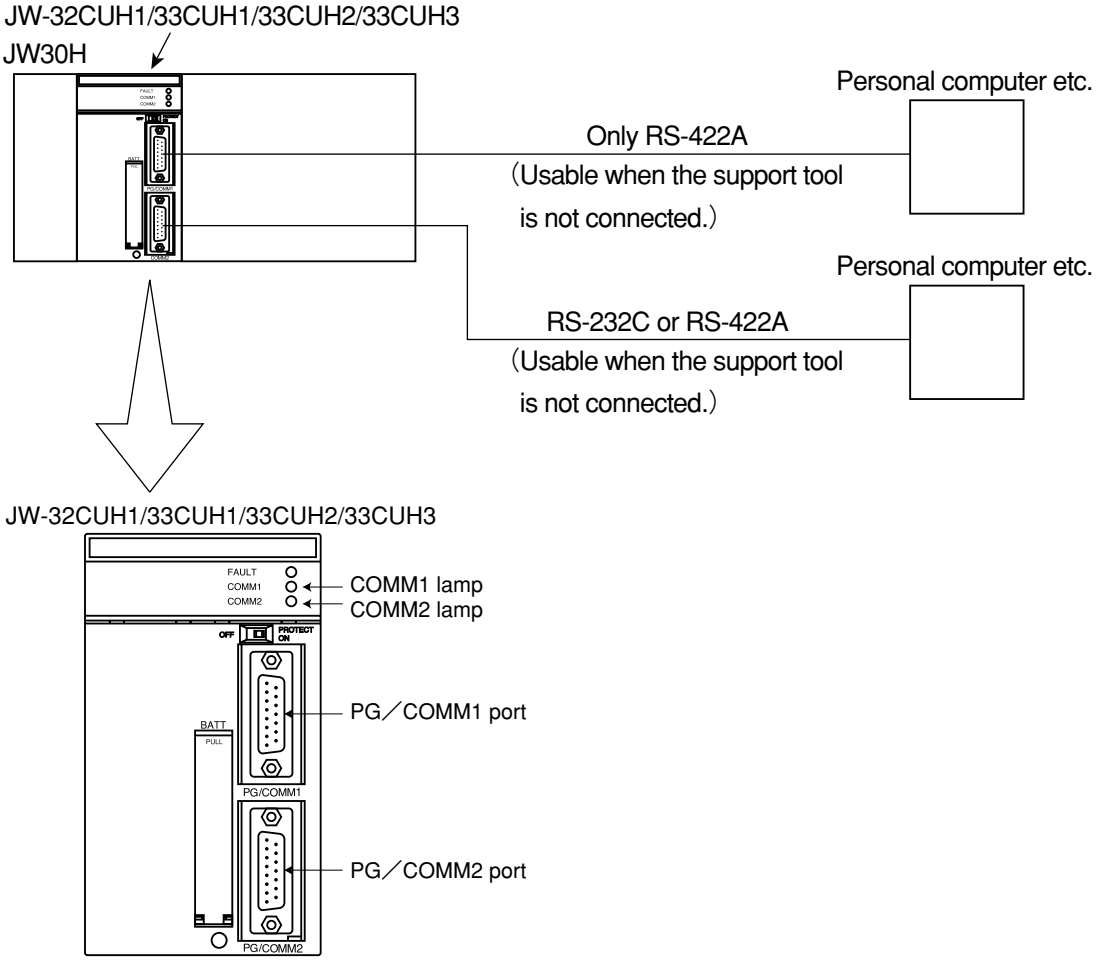
In case of large current L load and magnet: T = 40ms

In case of the L load with a diode for surge countermeasure, the life of relays may be similar to the case of T < 1ms.

Note 3: Use the relay output module, with the contact switching life of more than 100,000 times and within the current capacity of less than 2A.

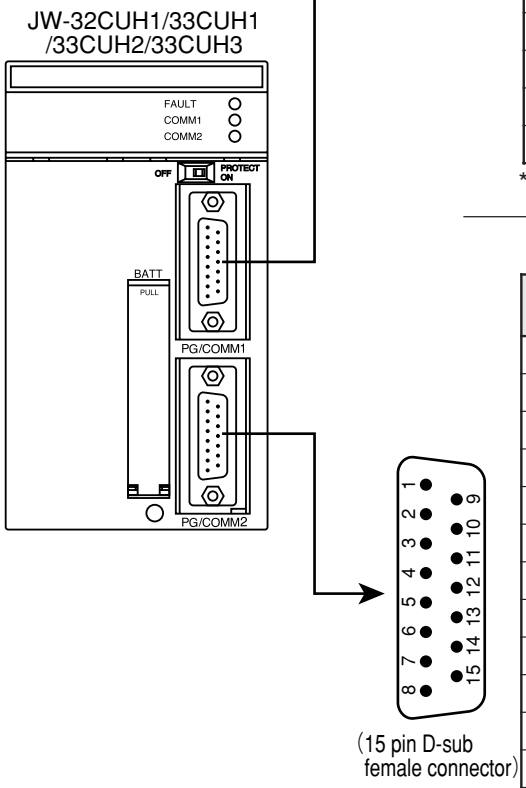
7-5 Communication port (JW-32CUH1/33CUH1/33CUH2/33CUH3)

Control module JW-32CUH1/33CUH1/33CUH2/33CUH3 have communication port (PG/COMM1, PG/COMM2).
The communication port can communicate with connected device having the I/O port of RS-232C/422A of host computer, such as personal computer.
Available for same function as SHARP's computer link.
When the support tool is not used, one set of control module can have two channels of communication port, and two systems such as personal computer and liquid crystal control terminal can be connected.



Name	Function
COMM1 lamp (yellow)	• Flickers during communication by connecting PG/COMM1 port and personal computer, etc.
COMM2 lamp (yellow)	• Flickers during communication by connecting PG/COMM2 port and personal computer, etc.
PG/COMM1 port (Only the RS-422A)	• Conneeted with support tool. Usable as communication port (RS-422A only) when the support tool is not used.
PG/COMM2 port (RS-232C/422A)	• Connect support tool. Usable as communication port (RS-232C/422A) when the support tool is not used.

[1] Pin arrangement of PG/COMM1 port, PG/COMM2 port



• PG/COMM1 port

Pin No.	Signal name	Contents	Signal
1	FG	Outside body grounding	---
2	—	*1	
3	SD(+)	Sending data (PC to personal computer)	RS-422A
4	—	*1	---
5	RTS(–)		RS-422A
6	SG	Signal grounding	---
7	SG	Signal grounding	
8	—	*1	
9	RD(+)	Receiving data (Personal computer to PC)	RS-422A
10	RD(–)	Receiving data (Personal computer to PC)	
11	SD(–)	Sending data (PC to personal computer)	
12	—	*1	---
13	RTS(+)		RS-422A
14	+5 V		---
15	+5 V		

*1: Not connected with pin No. 2, 4, 8, and 12.

• PG/COMM2 port

Pin No.	Signal name	Contents	Signal
1	FG	Outside body grounding	—
2	SD	Sending data (PC to personal computer)	RS-232C
3	SD(+)	Sending data (PC to personal computer)	RS-422A
4	RD	Receiving data (Personal computer to PC)	RS-232C
5	RTS(–)		RS-422A
6	SG	Signal grounding	—
7	SG	Signal grounding	
8	RTS	ON while PC is supplied power source *2	RS-232C
9	RD(+)	Receiving data (Personal computer to PC)	RS-422A
10	RD(–)	Receiving data (Personal computer to PC)	
11	SD(–)	Sending data (PC to personal computer)	
12	CTS	ON: Available sending, OFF: Ban sending	RS-232C
13	RTS(+)		RS-422A
14	+5 V		---
15	+5 V		

*2: When system memory #222 in the JW30H's control module is 00_{HEX} (default value), RTS signal will be turned ON while the PC is turned ON power. When it is set to 02_{HEX}, the RTS will be OFF while sending data, and OFF while other than sending data.
(Setting 02_{HEX} is available with software version 3.5 or the later for JW-32CUH1/33CUH1/33CUH2/33CUH3, and software version 3.0 or the later for JW-32CUH/33CUH.)

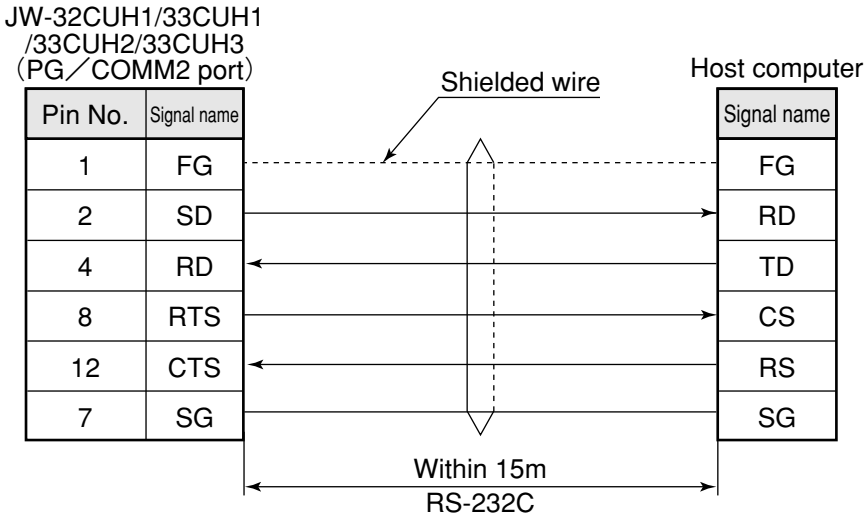
- Connector type that can be connected to the communication port (PG/COMM1 port, PG/COMM2 port) is 17JE-23150-02 (D8A) made by DDK.

Note: The JW-32CUH1/33CUH1/33CUH2/33CUH3 signal (pin) arrangement of communication port (PG/COMM1, PG/COMM2) deffer from communication port of JW-22CU (JW20 series).

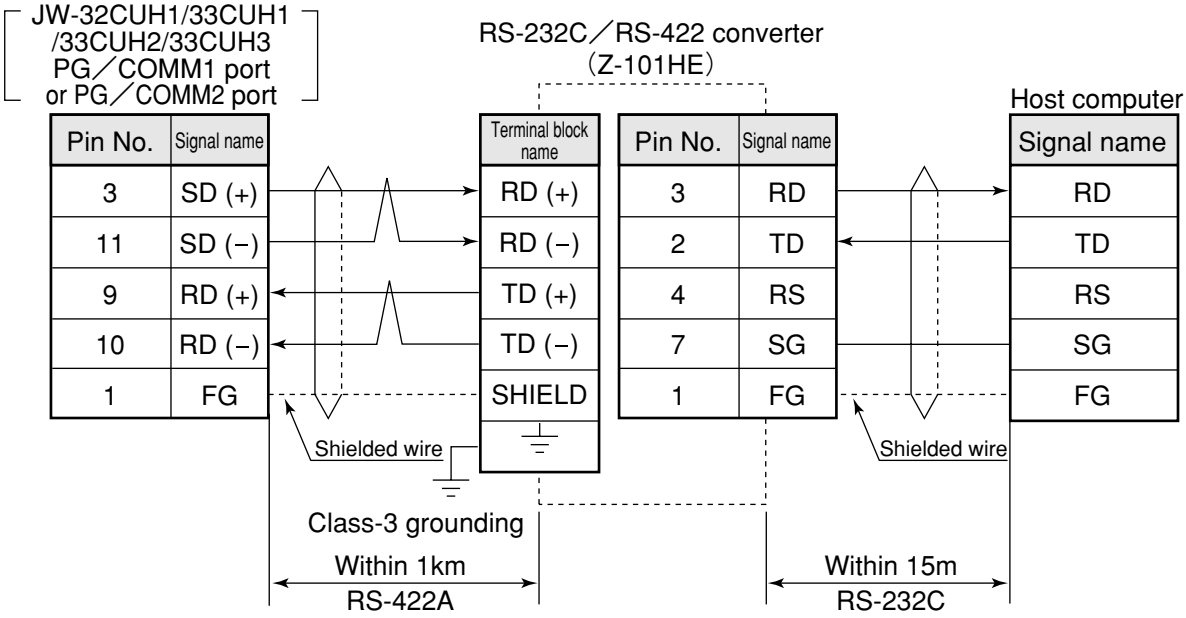
[2] Wiring figure

(1) When using RS-232C for communication method of host computer side.

Be within 15m for the total length of a communication cable.

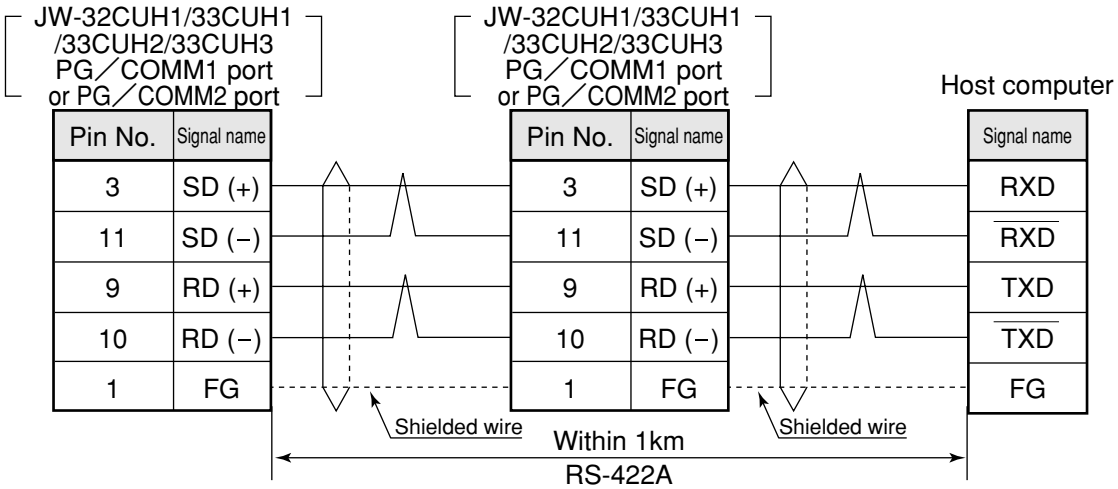


Use the RS-232C/RS-422 converter, such as Z-101HE, when the total length of the communication cable is over 15m.



(2) When using RS-422A for communication method.

Be within 1km for the total length of a communication cable.



[3] Set system memory of JW-32CUH1/33CUH2/33CUH3

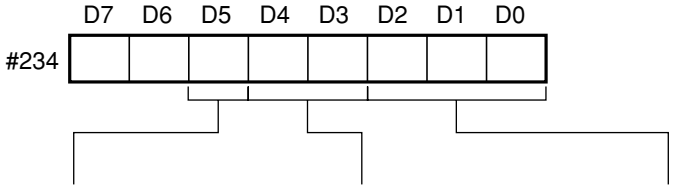
Set system memory #234/#235 (communication port 1) and #236/#237 (communication port 2) for communication conditions when communicating with a personal computer.

System memory number	Contents	
#234	Transfer rate, parity, stop bit	Set communication port 1 (PG/COMM1 port)
#235	Station No. 001 to 037 $_{OCT}$	
#236	Transfer rate, parity, stop bit	Set communication port 2 (PG/COMM2 port)
#237	Station No. 001 to 037 $_{OCT}$	

(1) Set communication port 1 (PG/COMM1 port)

① Set system memory #234

For transfer rate, parity, and stop bit, set ON (1) / OFF(0) of D0 to D5.



Stop bit

D5	Stop bit
0	1 bit
1	2 bits

Parity

D4	D3	Parity
0	0	None
0	1	Add
1	0	Even
1	1	——

Transfer rate

	D2	D1	D0	Transfer rate (bits/s)
	0	0	0	19200
	0	0	1	9600
	0	1	0	4800
	0	1	1	2400
	1	0	0	1200
*1	1	0	1	115200
*2	1	1	0	57600
*2	1	1	1	38400

Data is 7 bits fixed.

② Set system memory #235

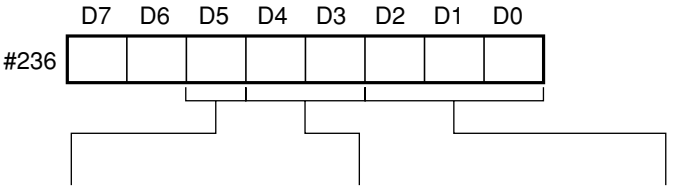
Set station No., 001 to 037$_{OCT}$ for communicating.

Note: The JW-32CUH/33CUH (conventional models) cannot be set to a transfer speed marked with "*2" above. Also, if these modules are set to "*1," their transfer speed will be 600 bits/s.

(2) Set communication port 2 (PG/COMM2 port)

① Setting system memory #236

For transfer rate, parity, and stop bit, set ON (1) / OFF(0) of D0 to D5.



Stop bit

D5	Stop bit
0	1 bit
1	2 bits

Parity

D4	D3	Parity
0	0	Nore
0	1	Add
1	0	Even
1	1	——

Transfer rate

	D2	D1	D0	Transfer rate (bits/s)
	0	0	0	19200
	0	0	1	9600
	0	1	0	4800
	0	1	1	2400
	1	0	0	1200
*1	1	0	1	115200
*2	1	1	0	57600
*2	1	1	1	38400

Data is 7 bits fixed.

② Set system memory #237

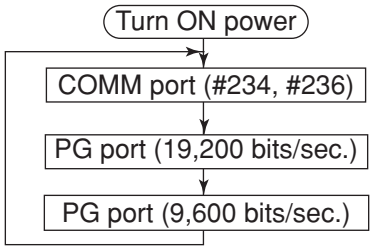
Set station No., 001 to 037$_{OCT}$ for communicating.

Note: The JW-32CUH/33CUH (conventional models) cannot be set to a transfer speed marked with "*2" above. Also, if these modules are set to "*1," their transfer speed will be 600 bits/s.

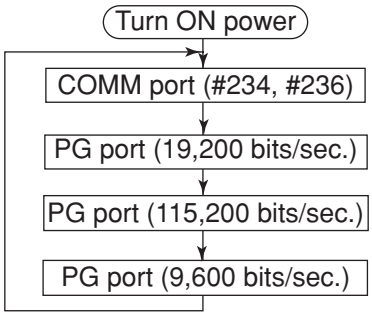
Remarks

- Change of the communication setting for the communication ports (#234, #236) is effective while turned ON the power.
- However, as the JW30H automatically changes the communication setting as shown below, it will take few number of retries until establishment of communication after changed settings.

[When JW-32CUH/33CUH is used]



[When JW-32CUH1/33CUH1/33CUH2/33CUH3 is used]



- As shown above, the JW32CUH/33CUH needs three times of retry and the JW-32CUH1/33CUH1/33CUH2/33CUH3 needs four times of retry to re-establish communication after changed setting, on the condition that the communication port successfully established communication just before changing the settings.

[4] Communicate with a personal computer

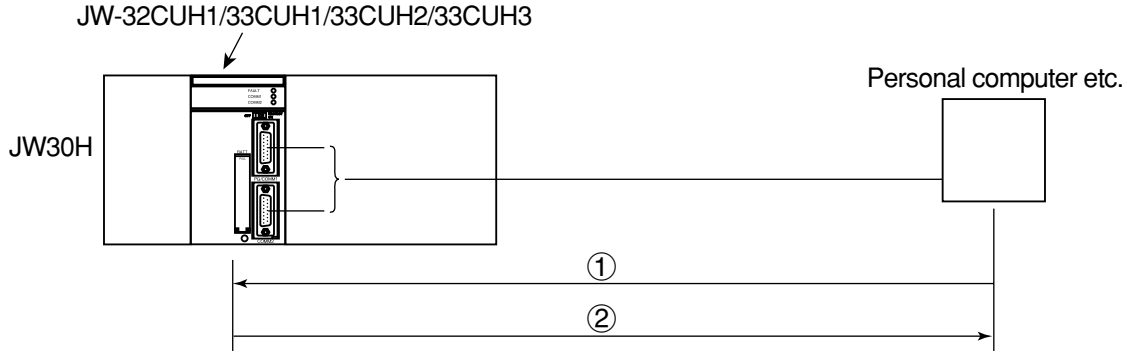
The following instructions are available for communicating between the JW30H (Control module : JW-32CUH1/33CUH1/33CUH2/33CUH3) and a personal computer. There are three type of command; read out command, write command and control command.

Command	Contents
Read out command	Messages that a personal computer transmits to the JW30H when it reads out data from the JW30H.
Write command	Messages that a personal computer transmits to the JW30H when it reads out data from the JW30H.
Control command	Messages that a personal computer transmits to the JW30H when it reads out data from the JW30H.

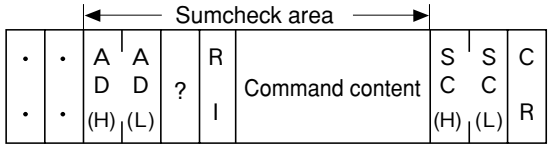
As for the detail of each command, see “List of commands” on pages 7-36 to 7-45, and “Computer link” section of user's manual of link module JW-21CM.

(1) Communication format

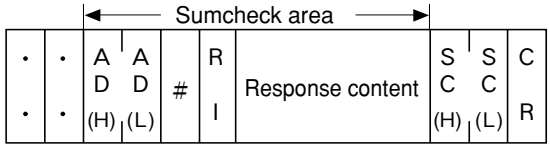
When a command from a personal computer is received, the communication port of JW-32CUH1/33CUH1/33CUH2/33CUH3 operates according to the received command, and sends the response. When an error occurs while processing, it returns error response.



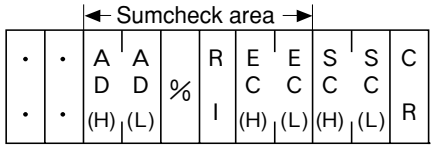
① Communication format of command (personal computer to JW30H)



② Communication format of response (JW30H to personal computer)



Error response where an error occurs



[Contents of communication format]

	Data	Using code (ASCII character)	Contents
*	AD (H) AD (L)	00 to 37 $_{OCT}$	Station No. • In command, the station No. to be received command. • In response, the station No. to send response.
	RI	0 to F $_{HEX}$	Response time (Set the time from receiving a command to responding. See page 7-32.)
*	SC (H) SC (L)	00 to FF $_{HEX}$	Sumcheck code (Search the mistake of transfer data. Refer to next page.)
*	EC (H) EC (L)	01 to 1B $_{HEX}$	Error code (Indicate error content. Refer to as follows.)

Indentification symbol	ASCII code	Contents
: (colon)	3A $_{HEX}$	Hedder (Indicates beginning of command and response.)
? (question)	3F $_{HEX}$	Indicates command.
# (number mark)	23 $_{HEX}$	Indicates response (at normal).
% (percent)	25 $_{HEX}$	Indicates response (at error).
CR (carriage return)	0D $_{HEX}$	Terminal mark (Indicates termination of a command and response.)

* (H) indicates upper digit, (L) indicates lower digit.

• **Contents of error code**

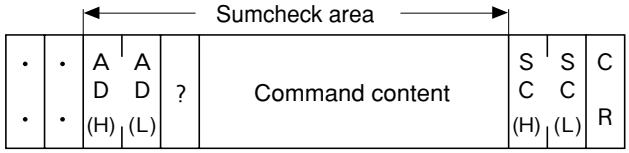
Error code ($EC_{(H)}$, $EC_{(L)}$)	Contents
01	Format error
02	Designated address is not TMR/CNT setting value
05	Number of transfer bytes is not correct
06	PC does not stop by HLT (stop PC processing)
07	Writing to PC memory is not executed correctly
08	Memory capacity, file capacity is full
0A	Parity error
0B	Framing error
0C	Overrun error
0D	Sumcheck error
0E	Prohibit program memory write (memory protection switch “ON”)
0F	Other CPU is accessing memory
10	Not match write mode
11	Not proguram area
12	Tried to write in ROM
1B	System memory error

- **Sumcheck code SC (H), SC (L)**

  The communication port detects error using sumcheck as well as party check in order to increase the reliability.

  ① **Sumcheck area (See page 7-29)**

  [Example] Command



  ② **Check method**

  1. Add data from station No. to the last data of the command contents or response contents (just before sumcheck code) that are summed up in ASCII code.
  2. Convert the sumcheck code (2 digits hexadecimal) to 8 bits data and add ① to the result. When the grand total is "0" (disregarded figure up), the message is regarded as correct, when the grand total is not "0," the message is regarded as an error.

  ③ **Produce method**

  1. Add data from station No. to the last data of the command contents or response contents (just before sumcheck code) that are summed up in ASCII code.

  2. Operate complement number of 2 of the result of 1.
     Complement number of 2: Turn over all the bits indicated by the binary system (0 to 1, 1 to 0) and add 1.

  [Example] The complement number of 2 of $4E_{HEX}$ is $B2_{HEX}$

  $4E_{HEX} \rightarrow 01001110$

  ↓ invert each bit

  10110001

  ↓ add 1

  $100110010 \rightarrow B2_{HEX}$

  3. Divide upper 4 bits and lower 4 bits and convert them to ASCII code.

  When sumcheck is not necessary, setting @ in the command line.

• **Response time RI**

When a personal computer is interpreter system, it executes programs one by one while interpreting. This personal computer may not have finished its process before receiving the response from the JW30H. As a countermeasure, setting the response time RI in command (max. 600ms).

$RI_{(HEX)}$	Response time (ms)	$RI_{(HEX)}$	Response time (ms)
0	0	8	80
1	10	9	90
2	20	A	100
3	30	B	200
4	40	C	300
5	50	D	400
6	60	E	500
7	70	F	600

As the JW30H accesses memories after one operation cycle, the actual response time is the total of setting value of RI in command and the waiting time of one operation cycle.

[Reference] Setting response time RI

It is difficult to recommend the optimum response time, as the optimum response time is varied depending on the model of personal computer, the programming language and the system program. First, set a fairly long time, then, shorten gradually.

Note: There are some limits for handling bit numbers by commands and for the communication buffer of personal computers. Be careful for handling bit numbers and communication buffers.

(2) Write mode

Write mode of PCs are “mode 0” (write prohibited for all memories) at power ON. Prior to writing program from the personal computer, change write mode to “mode 1” or “mode 2” using EWR command (setting of write mode). SWE command read out current status of writing mode.

Set write mode to “mode 0” as much as possible, except when writing date into PC. Each mode has restrictions as follow:

Mode 0	Write prohibited for all memories
Mode 1	Write enable only for data memory
Mode 2	Write enable for all memories

Note

- Turn OFF control module protect switch (write allowed) before executing write commands and change to write mode 2 using EWR command.

Each command can be executed in the write mode or when the PC is in the following state.

○ : Executable × : Non-executable

Function		Command name	Write mode			PC status	
			0	1	2	Stopped by HLT command	Run
Read-out command	Relay monitor	MRL	○	○	○	○	○
	Current value monitor of timer/counter/MD	MTC	○	○	○	○	○
	Register current value monitor	MRG	○	○	○	○	○
	Read out register of file 1	RFL	○	○	○	○	○
	Read out register of file 0 to 3	RFLF	○	○	○	○	○
	Read out register of file 00 to 03, 10 to 2C	(Note)RFLE	○	○	○	○	○
	Read out parameter of special I/O module	RPSR	○	○	○	○	○
		RPS	○	○	○	○	○
	Read out parameter of option module	RPO	○	○	○	○	○
	Read out system memory	RSM	○	○	○	○	○
	Read out program memory	RPM	○	○	○	○	○
	Read out date	MDY	○	○	○	○	○
	Read out time	MTM	○	○	○	○	○
Write command	Set/reset relay	SRR	×	○	○	○	○
	Set/reset timer/counter	SRT	×	○	○	×	○
	Write in register	WRG	×	○	○	○	○
	Write the same data in register	FRG	×	○	○	○	○
	Write in register of file 1	WFL	×	○	○	○	○
	Write in register of file 0 to 3	WFLF	×	○	○	○	○
	Write in register of file 00 to 03, 10 to 2C	(Note)WFLE	×	○	○	○	○
	Write in parameter of special I/O module	WPSR	×	×	○	○	×
		WPS	×	×	○	○	×
	Write in parameter of option module	WPO	×	×	○	○	×
	Write in system memory	WSM	×	×	○	○	×
	Write in program memory	WPM	×	×	○	○	×
	Change setting value of timer/counter	CTC	×	×	○	○	○
	Set date	SDY	×	○	○	○	○
	Set time	STM	×	○	○	○	○
	Set time revision	ACL	×	○	○	○	○
Control command	Stop operation	HLT	○	○	○	○	○
	Restart operation	RUN	○	○	○	○	○
	Monitor operation conditions	MPC	○	○	○	○	○
	Read memory capacity	VLM	○	○	○	○	○
	Read out write mode status	SWE	○	○	○	○	○
	Set write mode	EWR	○	○	○	○	○
	Turn back the message	TST	○	○	○	○	○
	Release secret/password registration	PAS	*1	*1	○	○	*1
	Set secret function	SES	*2	*2	○	○	*2
	Check secret function	SEI	○	○	○	○	○

*1: When data of command = 0 ○
= 1 or 2 ×

*2: When data of command = 0 ○
= F ×

Note: RFLE/WFLE command is not available for JW-32CUH/33CUH, JW-32CUH1/33CUH1.

(3) Address expression system

In each command, the setting value in the following table is set in the address module of communication format.

		Address (octal)	Setting value (octal)	Using command
Relay number		00000 to 15777 20000 to 75777	00000 to 15777 20000 to 75777	MRL, SRR
Timer/counter point of contact number		T0000 to T1777 C0000 to C1777	T0000 to T1777	MRL
Timer/counter number		0000 to 1777	0000 to 1777	MTC, SRT
MD number		000 to 777	0000 to 1777	MTC
Register address		⊐0000 to ⊐1577 ⊐2000 to ⊐7577 b0000 to b1777 b2000 to b3777 09000 to 09777 19000 to 19777 29000 to 29777 39000 to 39777 49000 to 49777 59000 to 59777 69000 to 69777 79000 to 79777 89000 to 89777 99000 to 99777 E0000 to E7777	A0000 to A1577 B2000 to B757 B0000 to B1777 B2000 to B3777 09000 to 09777 19000 to 19777 29000 to 29777 39000 to 39777 49000 to 49777 59000 to 5977 69000 to 69777 79000 to 79777 89000 to 89777 99000 to 99777 E0000 to E7777	MRG, WRG, FRG
File register address	File 0	000000 to 035777	000000 to 035777	RFL, RFLF, RFLE WFL, WFLF, WFLE
	File 1	000000 to 037777	000000 to 037777	
	File 2, 3	000000 to 177777	000000 to 177777	
	File 10 to 2C	000000 to 177777	000000 to 177777	
Special I/O module parameter address		000 to 177	0000 to 0177	RPSR, RPS WPSR, WPS
Option module parameter address		00 to 77	0000 to 0077	RPO, WPO
System memory address		#0000 to #2177	0000 to 2177	RSM, WSM
Program address	JW-31CUH1(15.5K words)	00000 to 36777	000000 to 036777	RPM, WPM, CTC
	JW-32CUH1(31.5K words) JW-33CUH1(31.5K words)	00000 to 76777	000000 to 076777	
	JW-33CUH2(63K words)	00000 to 076777	000000 to 076777	
	JW-33CUH3(63K words)	00000 to 176777	100000 to 176777	

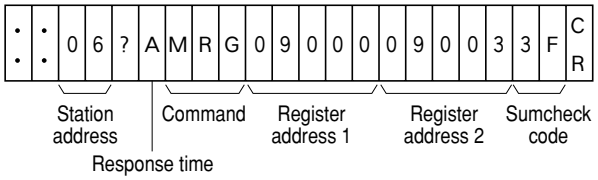
(4) Data expression system

Data are expressed by hexadecimal. Program contents are also expressed by hexadecimal based on machine language. Contents of bit configuration of program memory is not available.

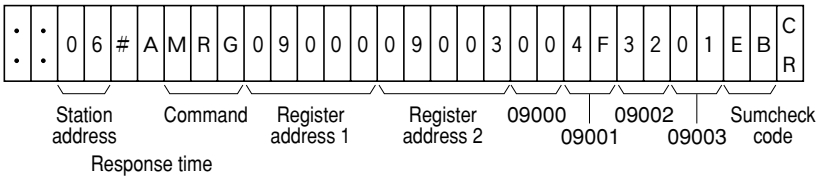
(5) Example of communication (monitor current value of register)

Monitor from 09000 to 09003 of PC06. (Response time : 100ms)

■ Command

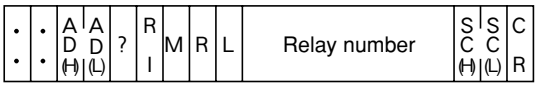
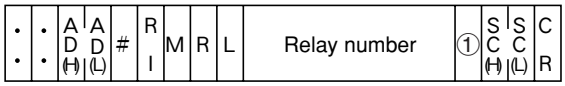
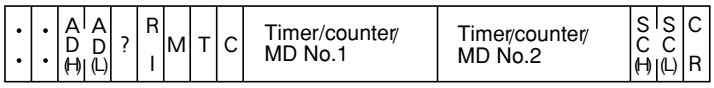
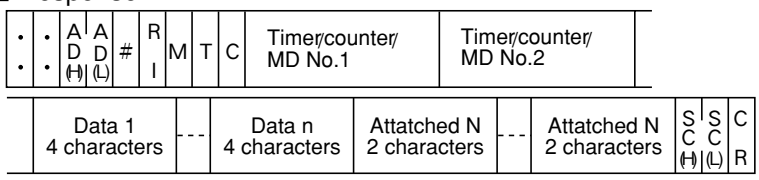
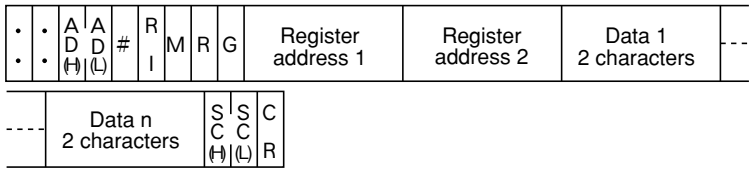
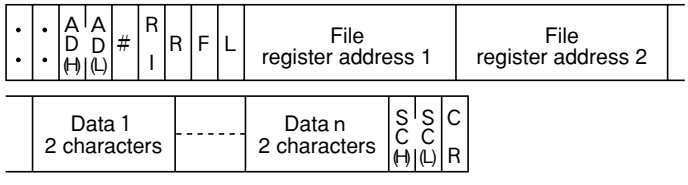


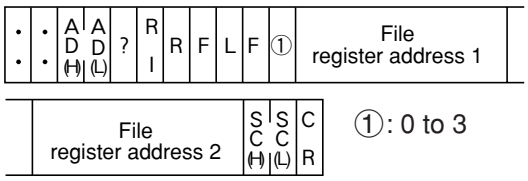
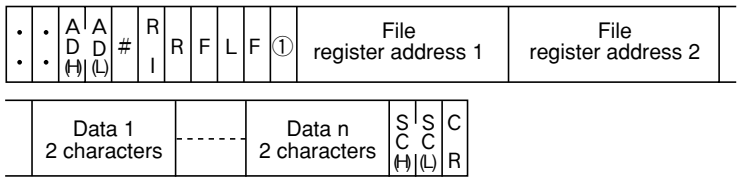
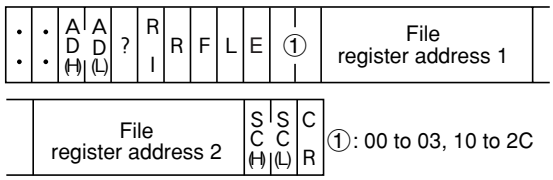
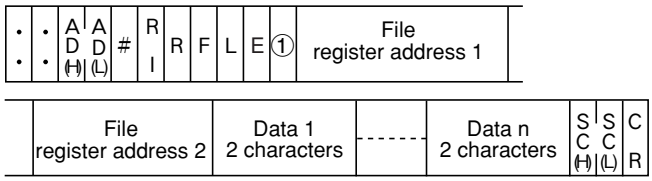
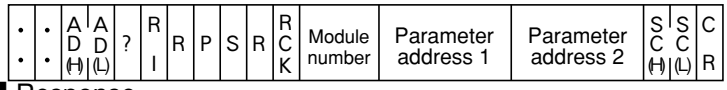
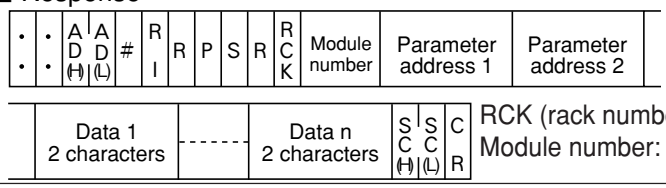
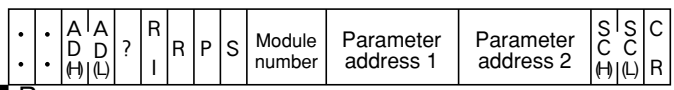
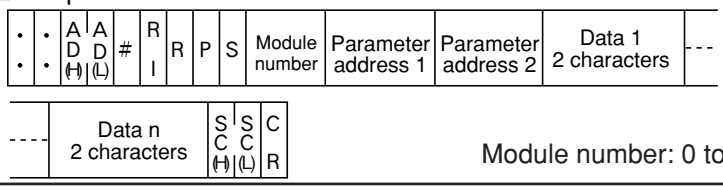
■ Response

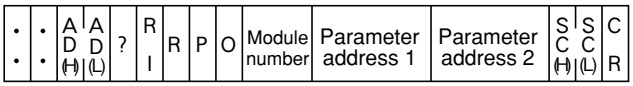
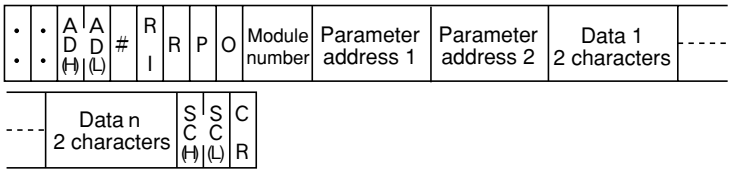
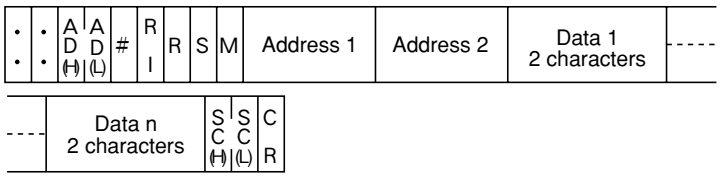
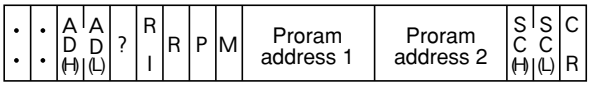
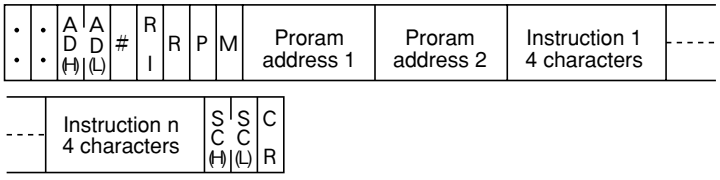
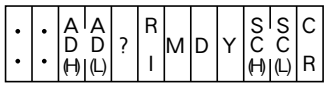
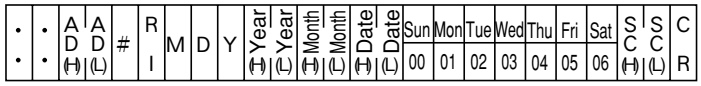

: : 0 6 # A M R G 0 9 0 0 0 0 9 0 0 3 0 0 4 F 3 2 0 1 E B C R
Station address
Command
Register address 1
Register address 2
09000
09001
09002
09003
Sumcheck code
Response time

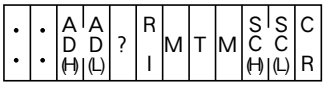
[5] List of commands

(1) Read out command

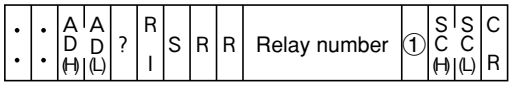
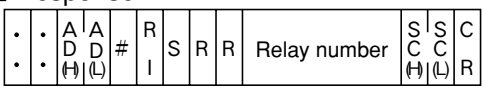
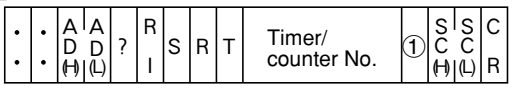
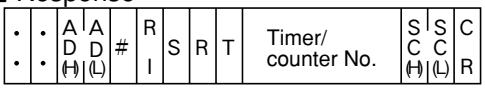
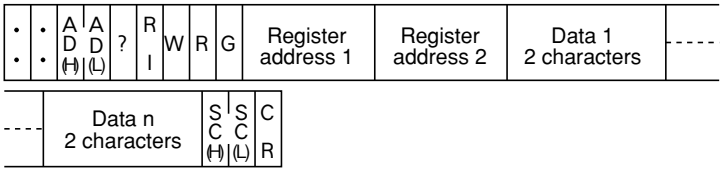
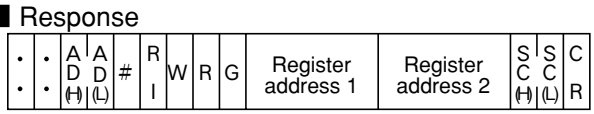
Function	Command name	Communication format
Relay monitor	MRL	Monitor ON/OFF state of the designated relay. ■ Command  ■ Response  Setting of ① 0 : OFF 1 : OF
Current value monitor of timer/ counter/MD	MTC	Monitor current value of timer/counter/MD number 1 to 2. ■ Command  ■ Response 
Register current value monitor	MRG	Monitor current value of register address 1 to 2. Sequential monitor up to 512 bytes. ■ Command ■ Response 
Read out register of file 1	RFL	Read out contents of file register address 1 to 2. Sequential read out up to 512 bytes. ■ Command ■ Response 

Function	Command name	Communication format
Read out file register of file No. 0 to 3.	RFLF	Data is read out from the file register area specified by file number ①. Read out contents of file register address 1 to 2. Sequential read out up to 512 bytes. ■ Command  ■ Response 
Read out file register of file No. 00 to 03, 10 to 2C [Available only for the JW-33CUH2/3]	RFLE	Date is read out from the file register area specified by file number ①. Read out contents of file register address 1 to 2. Sequential read out up to 512 bytes. ■ Command  ■ Response 
Read out Parameter of special I/O module	RPSR	Read out data of parameter address 1 to 2 of designated module. ■ Command  ■ Response  RCK (rack number): 0 to 3 Module number: 0 to 7
	RPS (When installed in Remote I/O slave station)	Read out data of parameter address 1 to 2 of designated module. ■ Command  ■ Response  Module number: 0 to 7

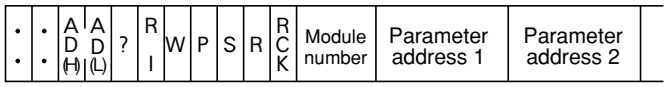
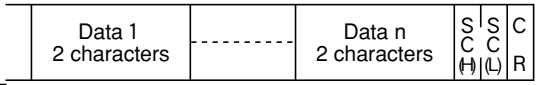
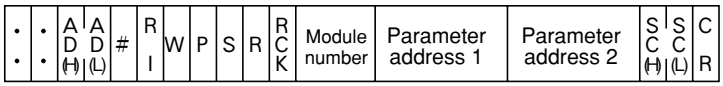
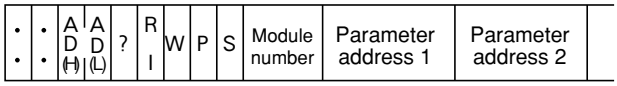
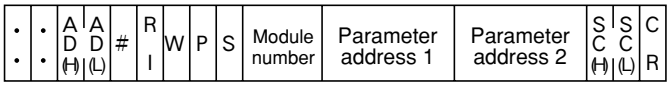
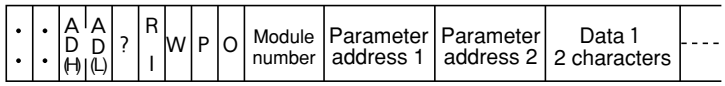
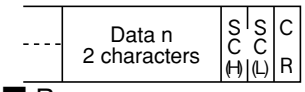
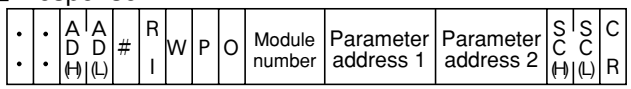
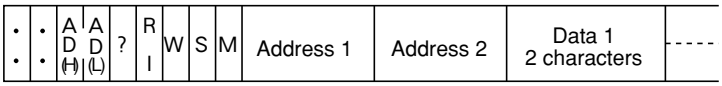
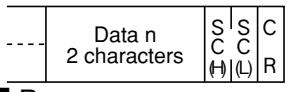
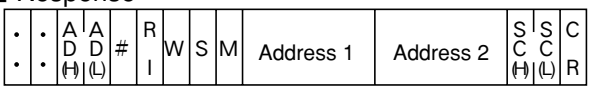
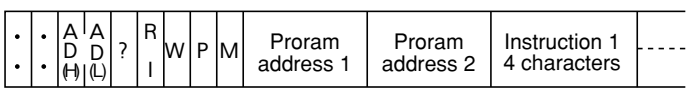
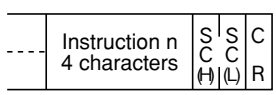
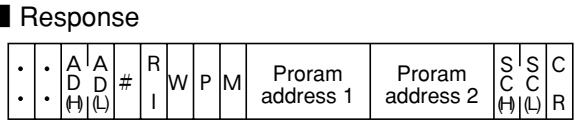
Function	Command name	Communication format
Read out parameter of option module	RPO	Read out data of parameter address 1 to 2 of specified module. ■ Command  ■ Response  Module No. : 0 to 6
Read out system memory	RSM	Read out contents in the system memory address 1 to 2. ■ Command ■ Response 
Read out program memory	RPM	Read out contents in the program memory address 1 to 2. ■ Command  ■ Response 
Read out date	MDY	Read out data of clock. ■ Command  ■ Response 

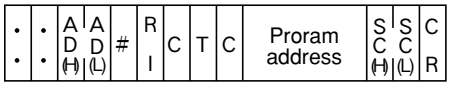
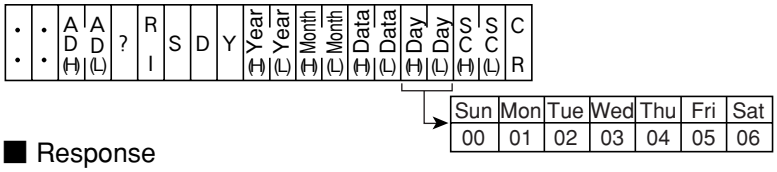
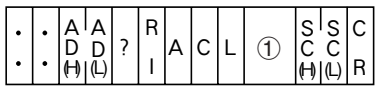
Function	Command name	Communication format
Read out time	MTM	Read out time of clock. ■ Command  ■ Response

(2) Write command

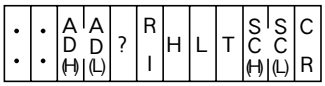
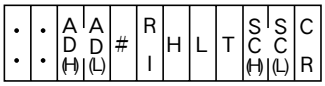
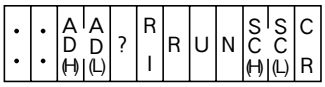
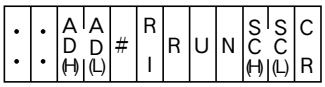
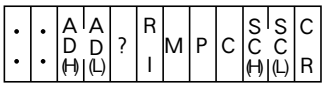
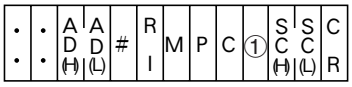
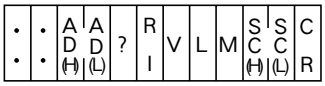
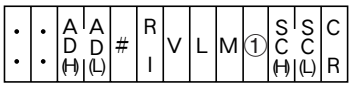
Function	Command name	Communication format
Set/reset relay	SRR	Set/reset the relay. ■ Command  Setting of ① 0:OFF 1:ON ■ Response 
Set/reset timer/ counter	SRT	Set timer/counter (time-up, count-up) or reset (return to setting value) ■ Command  Setting of ① 0:Reset 1:Set ■ Response 
Write in register	WRG	Write required data from the register address 1 to 2 in the register. ■ Command  ■ Response 

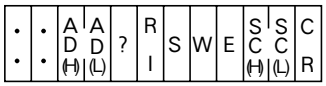
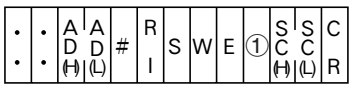
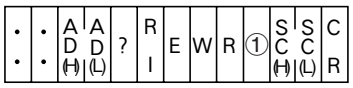
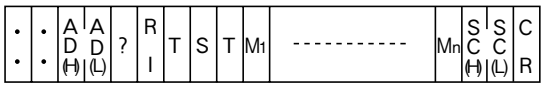
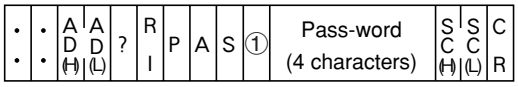
Function	Command name	Communication format
Write the same data in register	FRG	Write the same data in the register address 1 to 2 in the register. ■ Command [· · | AD(H) | AD(L) | ? | RI | F | R | G | Register address 1 | Register address 2 | Data 2 characters | SC(H) | SC(L) | CR] ■ Response [· · | AD(H) | AD(L) | # | RI | F | R | G | Register address 1 | Register address 2 | SC(H) | SC(L) | CR]
Write in register of file 1	WFL	Write in data of file register address 1 to 2. ■ Command [· · | AD(H) | AD(L) | ? | RI | W | F | L | File register address 1 | File register address 2] [Data 1 2 characters | ---------- | Data n 2 characters | SC(H) | SC(L) | CR] ■ Response [· · | AD(H) | AD(L) | # | RI | W | F | L | File register address 1 | File register address 2 | SC(H) | SC(L) | CR]
Write in file register of file No. 0 to 3.	WFLF	Date is written from the file register area specified by file number ①. Write in date of file register address 1 to 2. ■ Command [· · | AD(H) | AD(L) | ? | RI | W | F | L | F | ① | File register address 1 | File register address 2] [Data 1 2 characters | ---------- | Data n 2 characters | SC(H) | SC(L) | CR] ①: 0 to 3 ■ Response [· · | AD(H) | AD(L) | # | RI | W | F | L | F | ① | File register address 1 | File register address 2] [SC(H) | SC(L) | CR]
Write in file register of file No. 00 to 03, 10 to 2C [Available for the JW-33CUH2/3]	WFLE	Date is written from the file register area specified by file number ① (2 characters). Write in date of file register address 1 to 2. Sequential wirte up to 512 bytes. ■ Command [· · | AD(H) | AD(L) | ? | RI | W | F | L | E | ① | File register address 1] [File register address 2 | Data 1 2 characters | ---------- | Data n 2 characters | SC(H) | SC(L) | CR] ■ Response ① : 00 to 03, 10 to 2C [· · | AD(H) | AD(L) | # | RI | W | F | L | E | ① | File register address 1] [File register address 2 | SC(H) | SC(L) | CR]

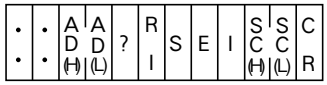
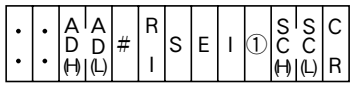
Function	Command name	Communication format
Write in parameter of special I/O module	WPSR	Write in data of parameter address 1 to 2 in designated module. ■ Command   RCK (rack No.) : 0 to 3 Module No. : 0 to 7 ■ Response 
	WPS (When installed in remote I/O slave station)	Write in data of parameter address 1 to 2 in designated module. ■ Command  Module No.: 0 to 7 ■ Response 
Write in parameter of option module	WPO	Write in data of parameter address 1 to 2 in designated module. ■ Command   ■ Response 
Write in system memory	WSM	Write date in the system memory address 1 to 2. ■ Command   ■ Response 
Write in program memory	WPM	Write instruction in the program address 1 to 2. ■ Command   ■ Response 

Function	Command name	Communication format
Change setting value of timer/ counter	CTC	Change timer/counter setting value in designated program address. ■ Command ■ Response 
Set date	SDY	Set data of clock. ■ Command  Sun 00 Mon 01 Tue 02 Wed 03 Thu 04 Fri 05 Sat 06 ■ Response
Set time	STM	Set time of clock. ■ Command ■ Response
Set correct of time	ACL	Set correct of time. ■ Command  ■ Response Setting of ①(2 characaters) 00: Start clock 01: Stop clock 08: 30 sec. correction

(3) Control command

Function	Command name	Communication format
Stop operation	HLT	Stop operation. ■ Command  ■ Response 
Restart operation	RUN	Release HTL (stop operation) command, restart operation. ■ Command  ■ Response 
Monitor operational condition	MPC	Monitor PC is running or stops. ■ Command  ■ Response  Contents of ① 0 : Running. 1 : Stop by other optional device. 2 : Stop by HLT command
Read out memory capacity	VLM	Read out program capacity and file capacity. ■ Command  ■ Response  Contents of ① (program capacity) 1 : 15.5K words 3 : 31.5K words 7 : 63K words

Function	Command name	Communication format
Read out write mode status	SWE	Read out current write mode status. ■ Command  Contents of ① prohibited for all memories 0 : Write 1 : Write enable only for data memory. 2 : Write enable for all memories. ■ Response 
Set write mode	EWR	Set write mode. ■ Command  Contents of ① prohibited for all memories 0 : Write protect 1 : Write enable only for data memory. 2 : Write enable for all memories. ■ Response
Turn back the message	TST	Send back the received command as it is. ■ Command  ■ Response M_1··· Mn: Message visible character string (20H to 7EH)
Release secret/ password registration	PAS	Release secret function, register password. ■ Command  ■ Response Contents of ① 0 : Release 1 : Temporary registration 2 : Regular registration

Function	Command name	Communication format
Set secret function	SES	Set secret function. ■ Command ■ Response Contents of ① 0: Enable seacret function F: Delete
Check secret function	SEI	Check secret function. ■ Command  ■ Response  Contents of ① 0: Disable seacret function. 1: Enable seacret function valid.

7-6 ROM operation

The ROM operation is a method of operating the JW30H by the content of the ROM, by storing the system memory or user program in the flash ROM, and transferring from ROM to RAM.
Saving of a program and more in the ROM is available, as the contents of the ROM do not disappear.
ROM operation is convenient for the following systems:

- Operation frequency is low.
- No alternation of program and system memory.
- Requires registering or loading programs quickly.

With JW30H series, flash ROMs are installed in the control module and so all the control module are possible ROM operation.

(1) ROM operation method

The ROM operation is available in four types as shown in the table below, depending on the setting value in the system memory #255. Set #255 depending on the use. (initial value is 000 $_{OCT}$)

Setting value		Transfer ROM to RAM (at power is ON)	Data memory after data transfer at power ON.	Mode after data transfer at power ON.	Transfer ROM to RAM using a tool.
OCT	HEX				
000	00	No	—	—	Available
021	11	Yes	Hold	Mode at power supply OFF.	Available
042	22	Yes	Clear*	Stop	Available
104	44	Yes	Clear*	Run	Available

* The stored data in the ROM is maintained.

Note 1: A battery is necessary even in ROM operation.

Note 2: Before transfer data from ROM to RAM (when the power is ON, or using a tool), make sure turn OFF the protect switch.

(2) Registerable contents to ROM

Areas that can be registered ROM is decided by setting value of system memory #256. (Initial value is 200_{OCT}.)

Setting value		Registerable contents to ROM				
OCT	HEX	System memory	Program	Register	File 1	File 2
200	80	#200 to 2177	Yes	No	No	No
201	81	#200 to 2177	Yes	8K bytes *1	No	No
202	82	#200 to 2177	Yes	No	16K bytes	64K bytes *2
203	83	#200 to 2177	No	8K bytes *1	No	No
204	84	#200 to 2177	No	No	16K bytes	64K bytes *2
205	85	#200 to 2177	Yes	8K bytes *1	16K bytes	No
206	86	#200 to 2177	No	8K bytes *1	16K bytes	64K bytes *2

*1 8 K bytes from 09000 to 99777 and E0000 to #57777. Area E6000 to E7777 cannot be stored in the ROM.

*2 When the JW-32CUH1 is used and its file capacity is selected to 32 K-bytes (program capacity 31.5 K words), ROM storable capacity of file 2 will be 32 K bytes.

(3) Writing in flash ROM

By the writing operation by the hand-held programmer JW-13PG or the ladder software JW-50SP, the program can be written into the flash ROMs of control modules.
See instruction manual of respective support tool for operation.

Chapter 8. Trial run

8-1 Check points prior to trial run

When installation and wiring are completed, check following points, prior to supplying power to the JW30H.

① Check the connection conditions of the power lines and the input/output lines.
- Whether the wiring is correct?
- Whether the screws in the terminal block are not loose?
- Whether the fitting of the connector is correct?
- Whether the each module is fixed securely?
- Whether the cable size is correct?

↓

② Check the connection conditions of the I/O expansion cable and 5 VDC cable.
- Whether the cable are connected correctly and fixed firmly between basic rack panel and expansion rack panel?

↓

③ Check the connection of the grounding line.
- Whether class-3 grounding is correctly grounded?
- Whether the grounding is not co-grounded with a high voltage board?

↓

④ Check the voltage of the power supply source.
- Whether power voltage of power supply is within rated voltage?

AC power supply (JW-21PU/33PU) ;
85 to 246 VAC,47 to 63Hz,
AC power supply (JW-31PU) ;
85 to 132 VAC,47 to 63Hz,
DC power supply (JW-22PU) ;
20.4 to 32 VDC

↓

⑤ Check the operation condition of the halt output circuit.
- Whether halt output signal is connected properly with external circuit in outside JW30H?

↓

⑥ Supply power.

8-2 Operation method for trial run

Operate the JW30H according to following process after precautions for operation is checked.

① Memory protect switch of control module is " OFF. "

↓

② Connect support tool.

↓

③ Supply power.

↓

④ Check whether the power lamp in the power supply module is "ON" or not.

↓

⑤ All Initialize.
- Clear system memory
- Clear program memory
- Clear data memory

↓

⑥ Set system memory (select function)
- See the programming manual, ladder instruction version.
- Setting can be omitted if not necessary.

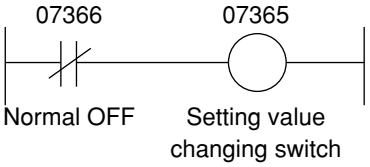
↓

⑦ Register I/O table.
- To be set only when changing the rack top address
- In case of auto I/O registration, setting is unnecessary

↓

⑧ Check the wiring to I/O module.
- Check the input port wiring using the display port of the input module or the monitoring function of the support tool.
- Check the output port wiring by forcing the switch ON／OFF of the output circuit in the support tool.

Note: Switch ON the setting value changing switch : 07365, prior to set the forcing switch ON／OFF for output.



↓

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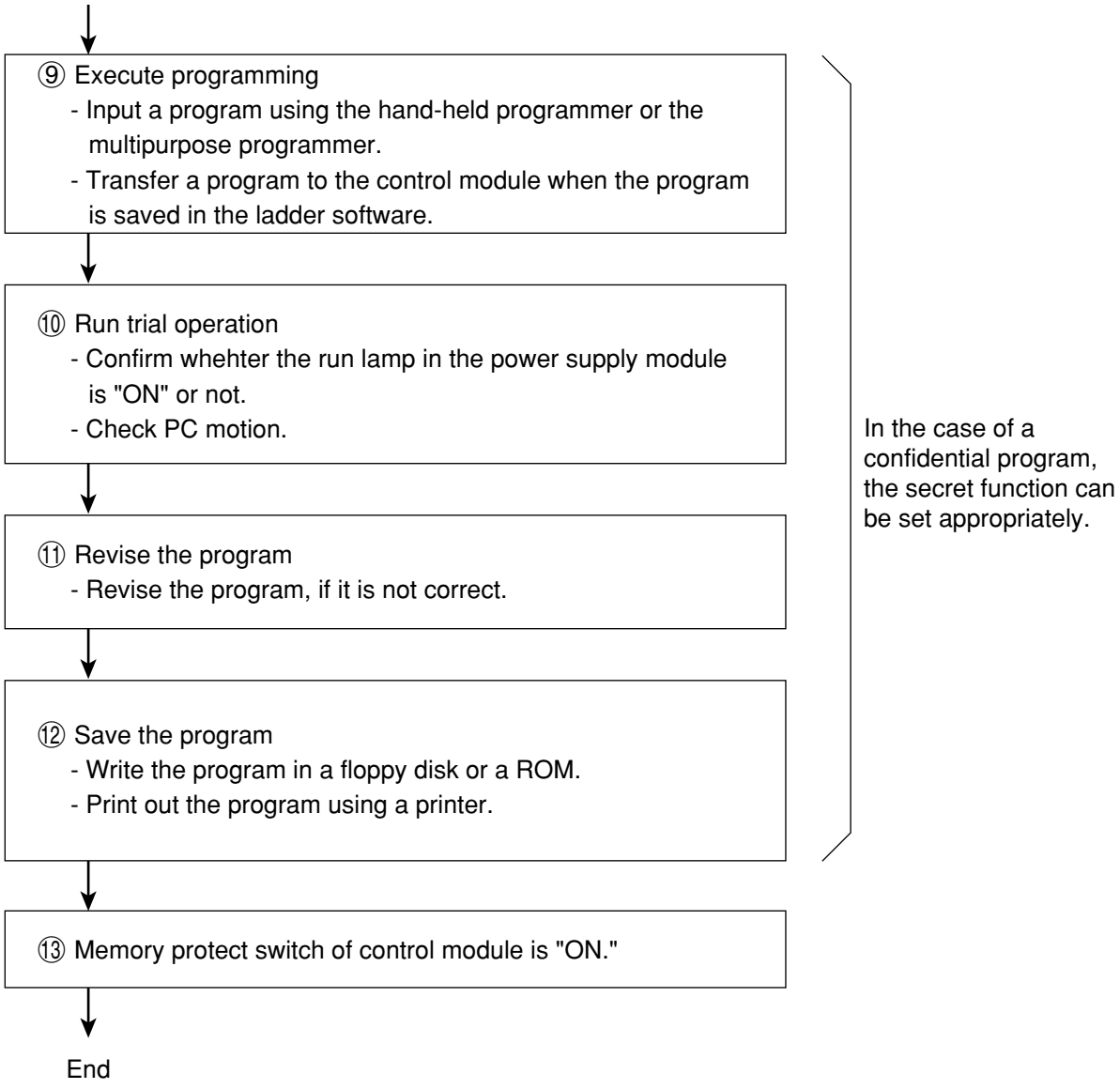

⑨ Execute programming
- Input a program using the hand-held programmer or the multipurpose programmer.
- Transfer a program to the control module when the program is saved in the ladder software.
⑩ Run trial operation
- Confirm whehter the run lamp in the power supply module is "ON" or not.
- Check PC motion.
⑪ Revise the program
- Revise the program, if it is not correct.
⑫ Save the program
- Write the program in a floppy disk or a ROM.
- Print out the program using a printer.
⑬ Memory protect switch of control module is "ON."
End
In the case of a confidential program, the secret function can be set appropriately.

Chapter 9. Maintenance and check

9-1 Periodical check

The following table is the recommended periodical check of used items, so as to keep the JW30H operating normally and in the best condition:

■ **General items**

Check items	Check contents	Standard	Remarks
Ambient temperature	Within the specifications (Temperature in the control box becomes the ambient temperature when the JW30H is installed in a control box.)	0 to 55°C	0 to 40°C when the hand-held programmer is installed.
Ambient humidity		35 to 90 %RH	35 to 85% RH and no condensation when the hand-held programmer is installed.
Atmosphere		No corrosive gas, no dust	———
Vibration, shock		No	

■ **Control module**

Check items	Check contents	Standard	Remarks
FAULT lamp	Make a visual check the FAULT (error) lamp	Light OFF	———
Battery	That the available period is over.	Within the validity.	
Installed condition	The module is fixed firmly	No looseness	

■ **Basic/expansion rack panel**

Check items	Check contents	Standard	Remarks
Connection cable	The I/O expansion cable and 5 VDC cable are connected firmly.	No looseness	———
Installed condition	It is fixed firmly on a panel		

■ **Power supply module**

Check items	Check contents	Standard	Remarks
Input power	Measure input voltage at the terminal block and check that it is within the specification.	AC power (JW-21PU/33PU) 85 to 264 VAC AC power (JW-31PU) 85 to 132 VAC DC power (JW-22PU) 20.4 to 32 VDC	———
Installed condition	The module is fixed firmly.	No looseness	
	Terminal block screws have not loosened.		

■ **Input/output module**

Check items	Check contents	Standard	Remarks
Input or output power supply	That the voltage supplied at cable to input/output module is within the specification. (Measure the "ON" level voltage in case of the input module)	• 100/120 VAC input module 85 to 132 VAC	JW-201N JW-211NA
		• DC input module 10 to 26.4 VDC	JW-202N JW-212NA JW-214NA JW-234N
		• 200/240 VAC input module 170 to 250 VAC	JW-203N
		• DC output module 10 to 27 VDC	JW-202S
		• AC output module 15 to 250 VAC	JW-203S JW-213SA
		• DC output module 4.75 to 27 VDC	JW-212SA
		• DC output module 4.75 to 30 VDC	JW-232S
		• Relay output module AC: 250 VAC or less DC: 30 VDC or less	JW-204S JW-214SA
Installed condition	The each module is fixed firmly	No looseness	———
	Terminal block screws have not loosened.		

■ **Program**

Check items	Check contents	Standard	Remarks
Floppy diskette	That the diskette is not over the rated register period.	Register the data in the floppy diskette changing every	———

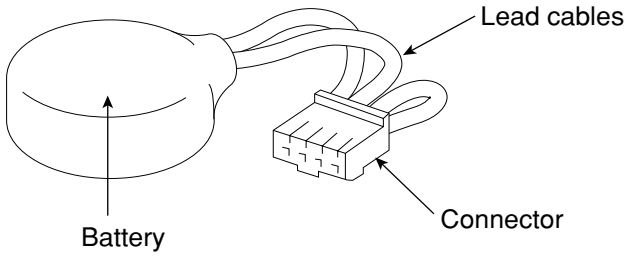
Note: Register a program in a floppy diskette using a ladder software in JW30H. The handling and maintenance is easy when a program is stored in a floppy diskette.

9-2 Exchange method of batteries

Exchange battery for memory back-up in control module JW-31CUH1/32CUH1/33CUH1/33CUH2/33CUH3 within its validity.
Battery module can be replaced while supplying power to the JW30H.

[Model name of battery module]

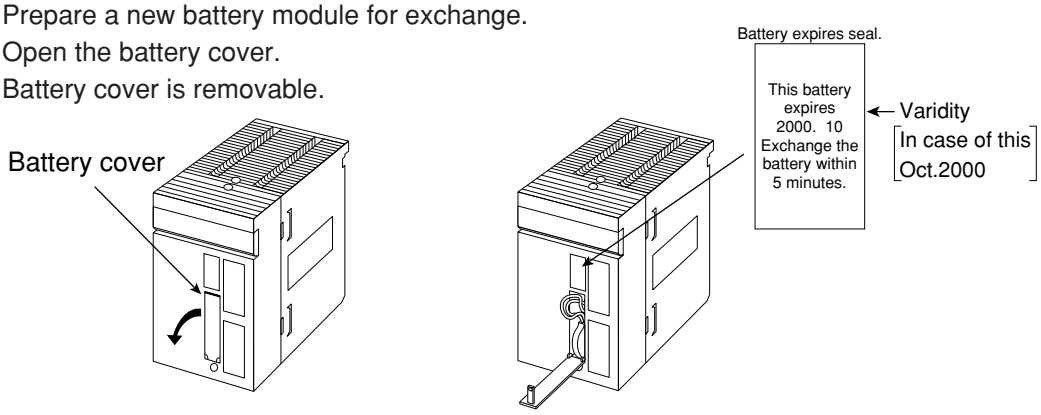
UBATN5005NCZZ



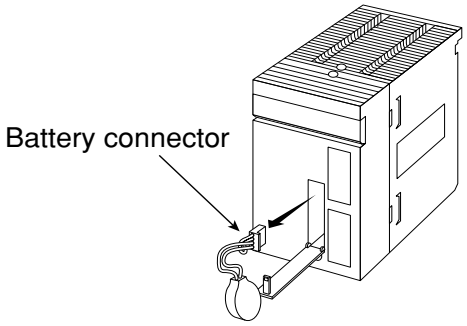
[Battery exchange procedure]

① Prepare a new battery module for exchange.

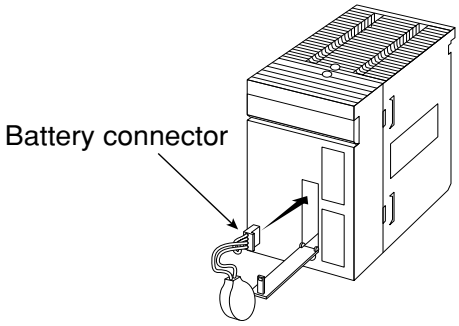
② Open the battery cover.
Battery cover is removable.


Battery cover
Battery expires seal.
This battery expires 2000. 10 Exchange the battery within 5 minutes.
Varidity
In case of this Oct.2000

③ Disconnect the battery module connector from the control module battery connector.



④ Insert a new battery module connector in the battery connector of the memory module.
The battery change must completed within 5 minutes. Otherwise, the memory may be erased.



⑤ Put battery into control module, and close battery cover.

Note: Do not subject the battery to impact of any kind. Do not pull on the lead wires of the battery, or liquid leakage accident may occur.

9-3 Self-diagnosis function

By the self-diagnostic function, the system is running while checking if its own hardware is normal or not. As a result of self-diagnosis, if abnormality is detected, the stop output is turned OFF (opened), and the fault lamp lights up to stop operation.
Self-diagnosis is executed in every scan, and when recovered to normal state, the stop output is automatically turned ON (closed), and the operation is resumed. (By the infinite loop of user program or the like, when the watchdog timer is actuated, the operation is stopped by the program mode, and the stop output is opened.)

[1] Abnormality not detected by self-diagnostic function

1. Abnormality directly affecting the self-diagnostic function itself of the control module (such as hardware abnormality of control module)

2. Abnormality in the outer side circuit module of input and output module (abnormality not affecting the I/O bus port)
   Examples:
   - When the load cannot be driven due to abnormality of output transistor of output module.
   - When input signal cannot be taken in due to abnormality of photo coupler of input circuit of input module.

3. Communication abnormality in data link
   Communication abnormality can be confirmed by the LED of option module or communication flag.
   * For details see "user's manual" of option module.

[2] Self-diagnosis function (Error code table)

Item			Contents	PC operating condition	Halt output	Control module	Indication lamp of power supply module		Special relay *3	Error code (BCD)	
										Special register	System memory
						FAULT	POWER	RUN		⌐0734	#160 to 16
Self-diagnosis	Memory error		Check instruction code	Stop	Open	Light ON	Light ON	Light OFF	07370	20	24
			Check system memory setting								23
			Check program ROM								25
			Check program sum								26
			Check I/O module registration table								28
	CPU error		Watch dog timer	Stop	Open	Light OFF	Light ON	Blinking	---	00	31
			RAM check (R/W)	Stop	Open	Light ON	Light ON	Light OFF	07371	30	32
			Hardware check								35
	I/O error	At re-freshing	I/O data bus						07373	40	44
			Output data check								42
			Installed module check								40
			I/O rack panel error								48
		At table verifyin-g	Table verify error							60	60
			Switch verify error								61
		At table registr-ation	Table registration error							70	70
			No module error								71
			I/O points over								72
			Switch setting error								73
	Special I/O error		Hardware error						07375	40	46
			Parameter error								47
			*1 *2 Fuse blow of JW-262S	Operation	Close	Light OFF	Light ON	Light ON	07363		49
				Stop	Open	Light ON	Light ON	Light OFF			
	Option error		*1 Hardware error	Operation	Close	Light OFF	Light ON	Light ON	07374	50	53
				Stop	Open	Light ON	Light ON	Light OFF			
	Power supply error		Power failure/low voltage	Stop	Open	Light OFF	Light OFF	Light OFF	07377	10	13 *4
	Expansion power supply error		Power failure/low voltage			Light ON	Light ON		07376	40	43
	Battery error		Battery low voltage/ No installation of battery	Operation	Close				07372	20	22
Halt output			Relay output, 100/200 VAC, 30 VDC, 1A, ON while PC operation (close)								

*1 The upper or lower state of each item may occur when the fuse is melted down in the system memory #206 or #207, or by the setting in the case of option abnormality.

(Setting)		(State)
Continue operation	→	Upper column
Halt	→	Lower column

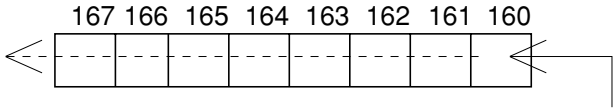
*2 When eternal power is not supplied to the JW-262S, a fuse failure will also occur.
A special attention must be paid when #206 is set to operation stoppage.

*3 The special relay: 7370 to 7377 are special relay which are turned ON when detected in self-diagnosis. In the event of abnormality, the kind of trouble is known by monitoring the special relay through support tool, host communication, or data link. (The special relay is turned ON in the event of abnormality, but I/O processing is not executed in the event of abnormality, and hence it cannot be taken out of the output.)

*4 The power source error is stored when the power source is turned ON even in normal state.

■ **Error code strage area #160 to 167**

The system memory in which the error code is stored are #160 to 167 are in stack structure, and the latest error code is stored in #160.



The newest error code
(The content in #160 is transferred to #161 when next failure occurs.)

9-4 Troubleshooting

In the event of abnormality, check the LED (RUN, FAULT) of the power supply module and control module, and remedy according to the check flow depending on the state.

[1] State of LED

RUN (Power supply module)	Fault (Control module)	Remarks	
OFF ○	ON ●	Detectable error for self-diagnosis	→ Check flow1
OFF ○	OFF ○	Power supply OFF	→ Check flow2
Blink ◎	OFF ○	Halt mode	→ Check flow3
ON ●	OFF ○	Disable detection error by self-diagnosis (input relation)	→ Check flow4
		Disable detection error by self-diagnosis (output relation)	→ Check flow5
ON ●	ON ●	Others	→ Check flow1

[2] Precondition of check flow

This check flow describes the countermeasure method (replacement of defective module and subsequent restoring method) in the event the system running normally so far suddenly breaks down. Therefore, the following cases are excluded.

1. Trouble due to error in initial setting when starting up the system (system memory, parameter, setting switch, etc.).
2. Momentary failure due to transient abnormality due to noise or other effect (irreproducible trouble).
3. Trouble due to effect of ladder program (customer's application).

[3] Prepare for causing trouble

1. **Be sure to keep back-up for program memory and system memory**
   When the control module is abnormal, the current program memory and the like may not be saved by the support tool, or the saved data may be incorrect. Therefore, store the latest program memory and back-up of system memory always in the floppy disk (FD).
   In the case of ROM operation, store the back-up in the FD, too.

2. **Prepare for support tool at hand**
   Prepare the support tool that can load/save of hand-held programmer or program.

3. **Prepare for spare parts**
   Prepare always a spare of each module to be ready for abnormality.

4. **Prepare for "setting SW, setting system memory, I/O relay allocation table" of each module**
   For prompt troubleshooting, prepare the "switch setting table and I/O relay allocation table" of each module.
   *Prepare also the "parameter setting table" in the module which requires setting of parameter aside from switches, such as special I/O module and option module.

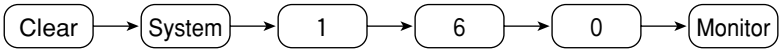
[4] Check flow

(1) Check flow 1

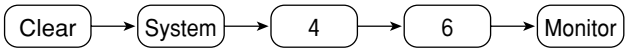
Monitor system memory #160 using a hand-held programmer.

Contents of #160 (HEX)	Countermeasure
32, 35	Replace the control module
23, 24, 26	Under RAM operation: Clear the memory, and then re-load the program. If this error still occurs, replace the control module. Under ROM operation: Turn ON the power from OFF. If this error still occurs, replace the control module.
25	Program re-loading. If this error still occurs, re-write the ROM program. If this error still occurs, replace the control module.
44	Replace the control module. If this error still occurs, replace I/O modules one after the other from the first module. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
40, 42, 48	Monitor #046 and replace the I/O module. If this error still occurs, replace the other I/O modules. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
60, 70	Check the rack No. switches on the expansion rack panel and the I/O bus expansion adapter (JW-32EA). If this error still occurs, monitor #046 and replace the I/O module. If this error still occurs, replace the other I/O modules. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
61, 73	Check if there are any doubling settings among module No. switches for the special I/O module, the I/O link master module, or the option module. If this error still occurs, replace the special I/O module, I/O link master module, and option module, one after the other.
71	Check that an I/O module is installed. If this error still occurs, replace the control module. If this error still occurs, replace the basic rack panel.
72	Install an I/O module within the max. number of I/O points. If this error still occurs, replace the control module. If this error still occurs, replace the control module. If this error still occurs, replace I/O modules one after the other from the first module. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
46, 47	Monitor #046 and replace the I/O module. If this error still occurs, replace the other I/O modules. If this error still occurs, check and replace the expansion cable and the termination connector. If this error still occurs, replace the I/O bus expansion adapter. If this error still occurs, replace the rack panel.
53	Replace the I/O link master module (can be monitored on #051) that FT lamp lights.
22	Exchange battery. If this error still occurs, replace the control module.
43	Make sure power is supplied to the expansion power supply. If this error still occurs, replace the expansion power supply. If this error still occurs, replace the expansion cable. If this error still occurs, replace the control module. If this error still occurs, replace the rack panel.
Can't monitor in programmer	Replace the control module.

《Monitor operation of system memory #160》



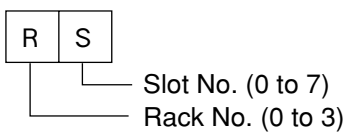
《Monitor operation of system memory #046》



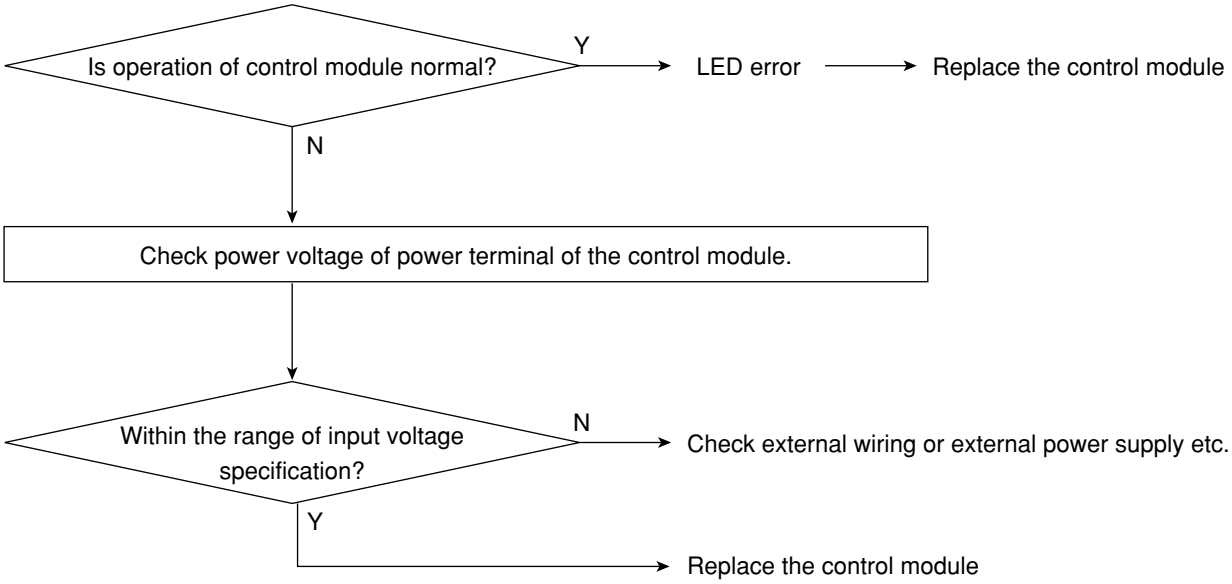
Monitor in HEX

*, * is error code

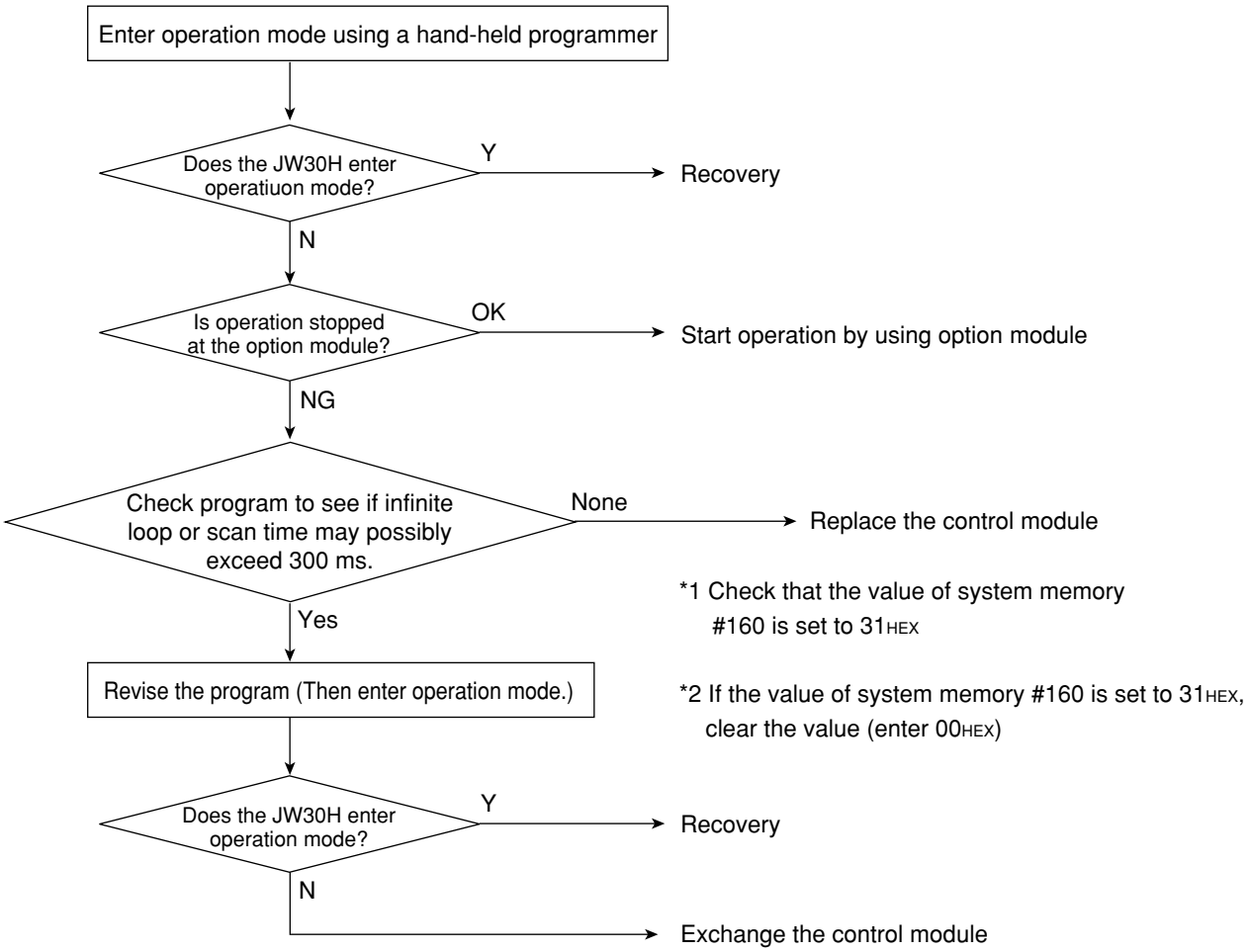
Monitor in HEX



(2) Check flow 2


Is operation of control module normal?
Y
LED error
Replace the control module
N
Check power voltage of power terminal of the control module.
Within the range of input voltage specification?
N
Check external wiring or external power supply etc.
Y
Replace the control module

(3) Check flow 3



*1 Check that the value of system memory #160 is set to 31_{HEX}

*2 If the value of system memory #160 is set to 31_{HEX}, clear the value (enter 00_{HEX})

<Operation of program check>

Grammer check → Clear → * → * → Detection

(4) Check flow 4

This flow shows the checking procedure in the event of abnormality of input signal not detected by the self-diagnosis of the control module.

Example of the error

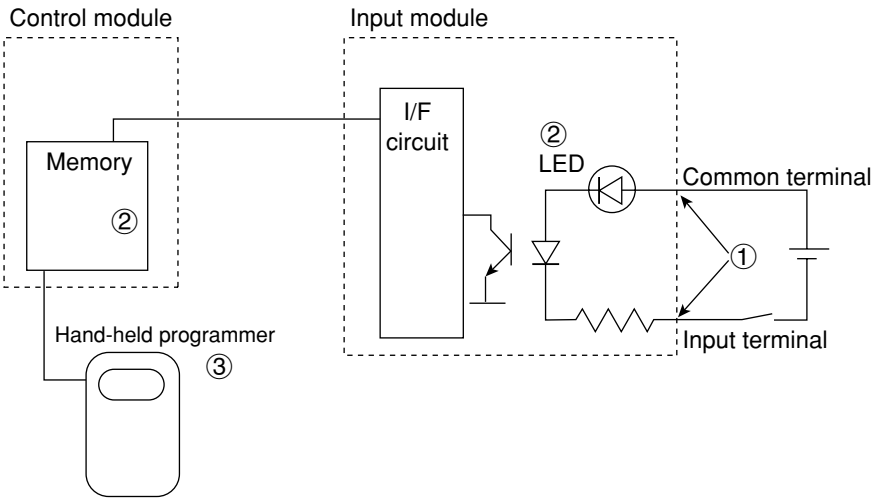
- All inputs of specific input module fail to be turned ON.
- Specific input fails to be turned ON (OFF).
- Among input signals of a same input module, operation of a certain input signal affects other input signal.

Countermeasure: Error input signal

① Measure the voltage between the corresponding input terminal of the input module and the common terminal using a tester.
If supply voltage is applied between terminals: ON
If supply voltage is not applied between terminals: OFF
② Check the state of LED of input module.
③ Connect hand-held programmer, and check ON/OFF by monitoring the data memory (input relay) corresponding to the abnormal input.

In case of ①=②=③ → Check the external wiring and power supply.
In case of the others → Exchange the input module.

[The flow of input signal]



(5) Check flow 5

This flow shows the checking procedure in the event of abnormality of output signal not detected by the self-diagnosis of the control module.

Example of the error

- All inputs of specific output module fail to be turned ON.
  (In this case, it is highly possible that the fuse of load power output is melted down.)
- Specific output fails to be turned ON (OFF).
- Among output signals of a same output module, operation of a certain output signal affects other output signal.

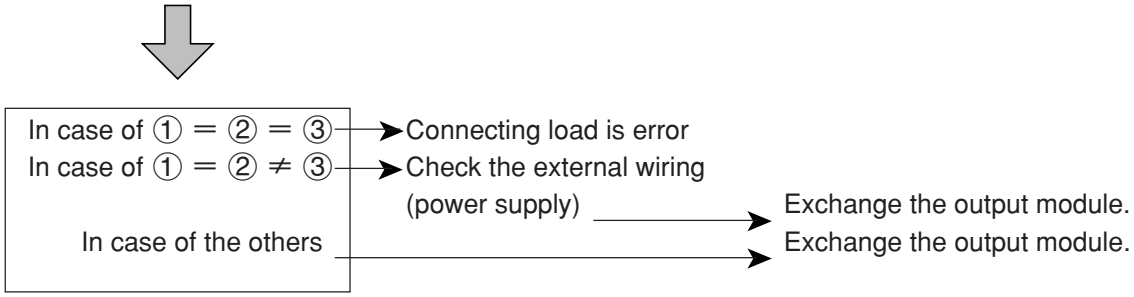
Countermeasure: Error output signal

① Connect hand-held programmer, and check ON/OFF by monitoring the data memory (output relay) corresponding to the abnormal output.

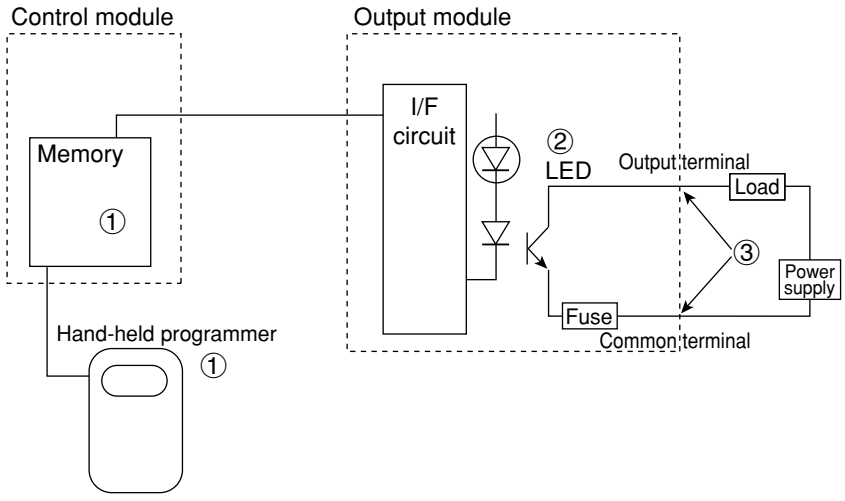
② Check the state of LED of output module.

③ Measure the voltage between the corresponding output terminal of the output module and the common terminal using a tester.
When the inter-terminal voltage is output ON voltage (about 1 V or less): ON
When the inter-terminal voltage is load supply voltage: OFF

Note: When the load power source is OFF and wiring to the load is disconnected, it is abnormal if the output is normal.


In case of ① = ② = ③
Connecting load is error
In case of ① = ② ≠ ③
Check the external wiring
(power supply)
Exchange the output module.
In case of the others
Exchange the output module.

[The flow of output signal]



Chapter 10. Support tool

10-1 Kinds of support tool

The support tool that can be used in the JW30H are classified into models that can use all functions of the JW30H (JW30H applicable support tool) and models that can be used only in the functional range of the conventional models (JW20H, JW50H/70H/100H) (JW30H non-applicable support tool).
Also, functions of some JW30H compatible support tools may be limited to those of conventional models (JW-31CUH/32CUH/33CUH), depending on the versions.
Refer to each instruction manual about operation in detail.

[1] JW30H applicable support tool

Module name	Model name	Version	Available function using JW30H
Hand-held programmer	JW-14PG	----	All function of JW30H
	JW-13PG	B mark	
		A mark No mark	Within the function of JW31CUH/32CUH/33CUH
Multipurpose programmer	JW-50PG	5.0 or more	All function of JW30H
		5.0 to 5.3 A	Within the function of JW-31CUH/32CUH/33CUH
Ladder software	JW-100SP	---	All function of JW30H
	JW-92SP JW-52SP	5.5 or more	
		5.0 to 5.3 A	Within the function of JW-31CUH/32CUH/33CUH
	JW-50SP	5.5I or more	All function of JW30H
		5.0 to 5.3 AI	Within the function of JW-31CUH/32CUH/33CUH

[2] JW30H non-applicable support tool

Module name	Model name	Version	Available function using JW30H
Hand-held programer	JW-2PG	---	Within the function of JW20H
	JW-12PG	---	Within the function of JW20H, JW50H/70H/100H
Multipurpose programmer	JW-50PG	4.0A or less	
Ladder processor Ⅱ	Z-100LP2S + Z-3LP2ES	Z-3LP2ES 5.2 or more	
Ladder software	JW-92SP	4.0 A or less	
	JW-50SP	3.0I	

Note: The JW-2PG and JW-12PG cannot forcibly set/reset relays, transfer data using a ROM writer or transfer data to a cassette tape.
Further, the JW-50PG (less than 4.0 A), JW-92SP (less than 4.0 A), or JW-50SP (3.0I) cannot forcibly set/reset relays, nor do sampling trace.

10-2 Directions of use support tool

This section explains the manner of manipulating the JW30H by using the JW30H non-applicable support tool.

[1] Mode

Set in the system memory #260 (PC model mode) of the JW30H to determine as what model the JW30H non-applicable support tool recognizes the JW30H.

Setting value of #260	Contents
50_{HEX}	JW50H/70H/100H mode · The JW30H is recognized as JW50H/70H/100H. · Operating within the function of JW50H/70H/100H is possible.
Except for 50_{HEX}	JW20H mode (initial mode) · The JW30H is recognized as JW20H. · Operating within the function of JW20H is possible.

Note: In case of JW-2PG using in JW30H, set 02_{HEX} in the system memory #136 of JW30H.

[2] Limit items

The following limit items are applied in each mode.

(1) In case of JW20H mode

- Access to the file register is impossible.
- Set parameter of special I/O is Max. 8.

(2) In case of JW50H/70H/100H mode

- Application instructions involved in I/O is unacceptable.
- Option, parameter of special I/O treat as file E.

In both modes, the program memory, data memory, system memory, and application instructions are in the scope of each mode model. The relay and register extended in the JW30H and additional application instructions cannot be used.

[3] Mode changing method

(1) In case of hand-held programmer

① Change setting value of system memory #260.

② Power supply of hand-held programmer is OFF. (ON/OFF of power source, plugging/unplugging of connector)

(2) In case of model having self power supply; Z-100LP2S, etc.

① If impossible to communicate due to different models, change the models. (If the mode model of support tool is JW20H, change to JW50H/70H/100H; if JW50H/70H/100H, change to JW20H.)

② When communication is enabled, change the setting value in the system memory #260.

③ The model is changed to the new setting mode.

Chapter 11. Specifications

11-1 General specifications

Items	Specifications			
	Using JW-21PU	**Using JW-22PU**	**Using JW-31PU (UL/CSA approved)**	**Using JW-33PU (UL/CSA/CE approved)**
Power voltage	85 to 264 VAC, 47 to 63Hz	20.4 to 32.0 VDC*	85 to 132 VAC, 47 to 63Hz	85 to 264 VAC, 47 to 63Hz
Guaranteed voltage interruption time	Available voltage interruption time of 10 ms max.			
Insulation resistance	10 M ohm min. at 500 VDC megge			
	(between AC external terminal and rack panel)	(between DC external terminal and rack panel)	(between AC external terminal and rack panel)	
Dielectrical strength	1500 VAC, 50/60 Hz for 1 minute (between AC external terminal and rack panel)	1000 VAC, 50/60Hz for 1 minute (between DC external terminal and rack panel)	1500 VAC, 50/60Hz for 1 minite (between AC external terminal and rack panel)	
Noise immunity	1000 Vp-p 1 µs width impulse (by noise simulator between the power line and rack panel)			
Storage temperature	– 20 to 70° C			
Ambient temperature	0 to 55° C			
Ambient humidity	35 to 90% RH (non-condensing)			
Atmosphere	Free from corrosive gas			
Vibration resistance	JIS C 0911 or equivalent - Multiple vibration width: 0.15 mm (10 to 57 Hz),9.8 m/s^2 (57 to 150 Hz), Number of sweep: (1 octave/minute), three directions (X, Y, and Z)			
Shock resistance	JIS C 0912 or equivalent, 147 m/s^2 (3 times in each X, Y and Z axis)			
Power consumption	60VA max *2			70 VA max *2
Weight	Approx. 3.6 kg	[When one power supply module, one control module, one memory module, and eight I/O modules installed in basic rack panel]		
Groundin	Class-3 grounding			

*1. As for DC input power source, use power source of 20.4 to 32 VDC (ripple rate 20% or less; however, ripple upper limit: 32 V or less, lower limit: 20.4 V or more).

*2. This value is at max load state of single power supply module.

11-2 System specifications

<table>
<tr><th>Items</th><th>Specifications</th></tr>
<tr><td>Number of rack panel connected</td><td>Max. 8 sets in total of 1 basic rack panel and 7 expansion rack panel. *1</td></tr>
<tr><td>Total length of expansion cable</td><td>Max. 50 m *1</td></tr>
<tr><td>Max. number of I/O points</td><td>JW-31CUH1: 512 points
JW-32CUH1: 1024 points
JW-33CUH1/33CUH2/33CUH3: 3072 points</td></tr>
<tr><td>Number of mounting I/O module, special I/O module, I/O link module, and option module</td><td>Total of 64 sets can be mounted *2
• Max. of 64 I/O modules can be mounted including on both the basic and the expansion rack panels (racks 0 to 7).
• Max. 32 special I/O modules can be mounted including on both the basic and the expansion rack panels (racks 0 to 3).
• Max. of 4 I/O link modules can be mounted on the basic rack panel.
• Max. of 7 option modules can be mounted on the basic rack panel.</td></tr>
<tr><td>Number of I/O relay occupied points of I/O module, special I/O module, option module. (Allocation of relay address)</td><td><table><tr><th>Module Item</th><th>Number of I/O relay area occupied points</th></tr><tr><td>8 points input/output module</td><td>16 points</td></tr><tr><td>16 points input/output module</td><td>16 points</td></tr><tr><td>32 points input/output module</td><td>32 points</td></tr><tr><td>Special I/O module</td><td>16 points</td></tr><tr><td>I/O link/option module</td><td>16 points</td></tr><tr><td>Vacant slot</td><td>16 points</td></tr></table>Option, I/O link and special I/O module is execlusive use relay area except for I/O relay area.</td></tr>
<tr><td>Program memory</td><td>The JW30H has a standard provision of memory port for storing the user program (fixed capacity).
The program can be stored in the built-in flash ROM.</td></tr>
</table>

*1 In case of using basic rack panel JE-34KB/36KB/38KB, expansion rack panel JW-34ZB/36ZB/38ZB, and I/O bus expansion adapter JW-31EA/32EA.

*2 In case of using basic rack panel JW-38KB and seven expansion rack panel JW-38ZB.

11-3 Performance specifications

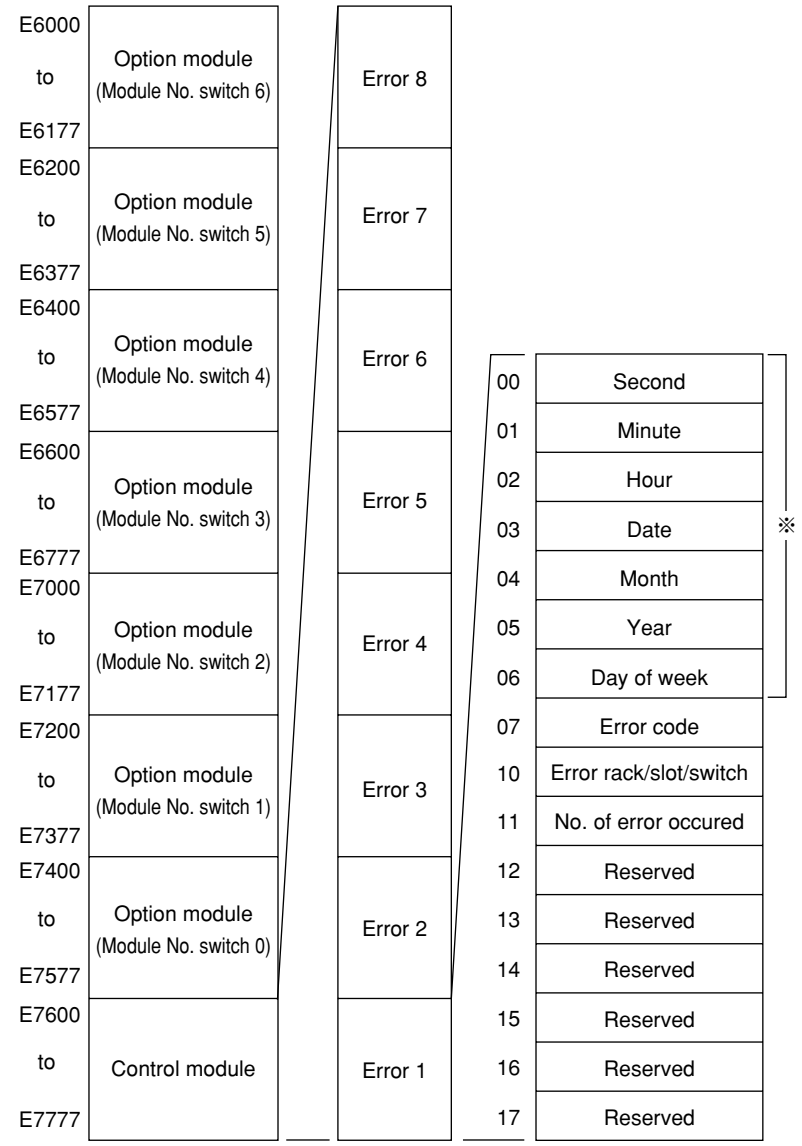
Items		Specifications				
		JW-31CUH1	JW-32CUH1	JW-33CUH1	JW-33CUH2	JW-33CUH3
Program system		Stored program system				
Control system		Compatible cyclic calculation and interrupt dealing system				
Processing speed		Basic instruction (except OUT, TMR, CNT, MD) : 0.038 μs/instruction. OUT instruction : 0.076 μs/instruction Application instructions, TMR, CNT, MD instructions : average number μ to several tens μs/instruction				
Type and numbers of instruction		Basic instruction : 20 Application instruction : 117 (150 to JW-31CUH1)				
Program size		7.5K words	15.5K words/31.5K words (switchover)	31.5K words	63K words	
Memory back-up		By built-in lithium battery. (Available for ROM operation using integrated flash ROM.)				
I/O control system		Both block refresh system and refresh system by instruction are applied.				
Max. numbers of I/O points		512 points	1024 points	3072 points *1		
		Max. rack panels : 8 rack panels *2				
Data memory	Relay	3072 points (00000 to 15777, 20000 to 75777) [□0000 to □1577, □2000 to □7577]				
	Relay for option module	2560 points (10000 to 14777) [□1000 to □1477]				
	Flag for option module	448 points (15000 to 15677) [□1500 to □1567]				
	Flag for I/O link	64 points (15700 to 15777) [□1570 to □1577]				
	Relay for I/O link	2048 points (20000 to 23777) [□2000 to □2377] *3				
	Relay for special I/O module (basic system)	4096 points (30000 to 33777) [□3000 to □3777]				
	Relay for special I/O module (Remote I/O slave station)	1024 points (40000 to 41777) [□4000 to □4177]				
	Special relay	64 points (07300 to 07377) 07300 to 07337 : Reserved area 07340 to 07347 : Error code strage 07354 : Non-carry flag 07355 : Error flag 07356 : Carry flag 07357 : Zero flag 07360 : 0.1 second clock 07362 : Initialize pulse 07363 : Fuse blown 07364 : 1.0 second clock 07365 : Setting value change switch 07366 : Normally OFF contact 07370 : Memory error 07371: CPU error 07372 : Battery error 07373 : I/O error 07374 : Option error 07375 : Special I/O error 07376 : Expansion power supply error 07377 : Power supply error				

*1 In case of 32 sets of 32-point modules and 32 sets of 64-point modules (special I/O modules) are mounted.

*2 In case of using basic rack panel JW-34KB/36KB/38KB, expansion rack panel JW-34ZB/36ZB/38ZB, and I/O bus expansion adapter JW-31EA/32EA.

*3 Each relay is setted by module No. switch on the face of special, I/O link, and option module.

<table>
<tr><th colspan="2" rowspan="2">Items</th><th colspan="5">Specifications</th></tr>
<tr><th>JW-31CUH1</th><th>JW-32CUH1</th><th>JW-33CUH1</th><th>JW-33CUH2</th><th>JW-33CUH3</th></tr>
<tr><td rowspan="3">Data memory</td><td>Timer/counter/MD</td><td colspan="5">Total 1024 points [000 to 1777 : timer and counter · in common]
• Timer set time
100 ms timer (TMR0000 to 1777)
0.1 sec. to 199.9 sec.
0.1 sec. to 3276.7 sec.(BIN)
0.1 sec. to 799.9 sec.(BCD)
10 ms timer (TMR 0400 to 0777)
0.01 sec. to 19.99 sec.(BCD)
TMR 0400 to 0777 is selectable timer feature of 100 ms unit and 10 ms unit.
• Counter setting value 1 to 1999
1 to 32767 (BIN)
1 to 7999 (BCD)
• MD setting value 0 to 999
The current value of the counter and MD are kept ON at power OFF. Timer is selectable between kept or reset after power OFF. Assignable timer/ counter setting value into registers. (Refer to application instructions F-260, Fc260, F-261 and Fc261 of programming manual.)</td></tr>
<tr><td>Register</td><td colspan="5">9216 bytes (kept after power OFF)
09000 to 09777, 19000 to 19777, 29000 to 29777,
39000 to 39777, 49000 to 49777, 59000 to 59777,
69000 to 69777, 79000 to 79777, 89000 to 89777,
99000 to 99777, E0000 to E7777.</td></tr>
<tr><td>Current timer storage register</td><td colspan="2">———</td><td colspan="3">Second : 99770
Minute : 99771
Hour : 99772
Day : 99773
Month : 99774
Year : 99775
The day of the week : 99776
Control code : 99777</td></tr>
</table>

<table>
<tr><th colspan="2" rowspan="2">Items</th><th colspan="5">Specifications</th></tr>
<tr><th>JW-31CUH1</th><th>JW-32CUH1</th><th>JW-33CUH1</th><th>JW-33CUH2</th><th>JW-33CUH3</th></tr>
<tr><td rowspan="2">Data memory</td><td>Error history storage register</td><td colspan="5">This register can store the last 8 error codes of the control module and option module including the error occurrence time (except for JW-31CUH1) and the number.
Total : 1K bytes (E6000 to E7777)
 

The error occurrence time is stored by 24 hour indication.
※JW-31CUH1 is not fixed.</td></tr>
<tr><td>File register</td><td>No</td><td>File 1
(16K bytes)
File 2
(Change between 32K and 64K bytes)

Total
48K/80K bytes</td><td>File 1
(16K bytes)
File 2,3
(Each 64K bytes)

Total
144K bytes</td><td>File 1
(16K bytes)
File 2,3
(Each 64K bytes)
File 10 to 14
(Each 64K bytes)

Total
464K bytes</td><td>File 1
(16K bytes)
File 2,3
(Each 64K bytes)
File 10 to 1F
(Each 64K bytes)
File 20 to 2C
(Each 64K bytes)

Total
2000K bytes</td></tr>
</table>

Items	Specifications				
	JW-31CUH1	JW-32CUH1	JW-33CUH1	JW-33CUH2	JW-33CUH3

System memory

Number (OCT)	Contents	
#010 to 017	Monitor the timer (not available for JW-31CUH1)	
#030	Monitor the minimum scanning time	(lower digit BCD)
#031	Ditto	(upper digit BCD)
#032	Monitor the current scanning time	(lower digit BCD)
#033	Ditto	(upper digit BCD)
#034	Monitor the maximum scanning time	(lower digit BCD)
#035	Ditto	(upper digit BCD)
#046	Monitor the error detected I/O rack panel and slot No. (OCT)	
#050	Monitor the error switch No.	(Option module)
#051	Ditto	(I/O link master module)
#052	Monitor the error address on user? s program	(lower digit)
#053	Ditto	(upper digit)
#114 #115	Select octal/decimal/hexadecimal in the address/relay/register/label/application instructions.	
#136	Set the tool model.	
#160 to 167	Store the error code of self-diagnosis	
#170 to 177	Store the error code on option module.	
#201	Set the resetting conditions of TMR	
#202	Set the resetting conditions of CNT	
#206	Set the operation continue/stop at fuse blown detecation.	
#207	Set the operation continue/stop at option error.	
#210	Selecting error history strage range.	
#211	Set the operation continue/stop at I/O link master module error.	
#220	Set file top address for comment memory.	
#222	Communication system of PG/COMM 2 port.	
#223	Selecting the clock feature (not available for JW-31CUH1)	
#224 #225	Set comment memory using area.	
#226	Set fixed scan time	
#227	Selecting the 10 ms timer function	
#230	Set the a latched relay area	(lower digit)
#231	Ditto	(upper ditig)
#232	Set output hold address	(lower digit)
#233	Ditto	(upper digit)
#234 #235	Set the communication port 1 (not available for JW-31CUH1)	
#236 #237	Set the communication port 2 (not available for JW-31CUH1)	
#240 to 243	Set interrupt processing	
#246	Set extend for allowable voltage interruption time	
#247	Selecting the rack top address	
#250	Set latched relay area of expansion relay area.	(lower digit)
#251	Ditto	(upper digit)
#252	Set output hold address of expansion relay area.	(upper digit)
#253	Ditto	(lower digit)
#255	Set ROM operation mode	
#256	Set ROM contents	
#257	BCC check code	
#260	Model mode	

Items		Specifications				
		JW-31CUH1	JW-32CUH1	JW-33CUH1	JW-33CUH2	JW-33CUH
Parameter memory		Parameter for special I/O module : 128 bytes x 32 module Parameter for special I/O module (Install in the remote I/O slave station) : 128 bytes x 8 modules Parameter for option module : 64 bytes x 7 modules				
Interrupt program		There are two types of interruption program, one is input interruption and the other is timer interruption. Both types can be set independently of interruption permission/prohibition. If interruption prohibition is set, you can use the interruption label as the conventional label. Input interruption : 16 points (LB1360 to LB1377) Timer interruption : 1, 2, 5, 10, 20 ms in each (LB1353 to LB 1357)				
Communication por		--------	Using PG/COMM1 port or PG/COMM2 port. Communication standard : RS-232C/RS-422A (RS-232C is only PG/COMM2 port) Transfer rate : 115200/57600/38400/19200/9600/4800/2400/1200 bits/s Data length : 7 bits Parity bit : odd/even/none Stop bit : 1/2 bit Connection form : 1:1 (RS-232C) 1: N (RS-422A) Communication format : Computer link or equipment Connector : 15 pin D-sub No of connected stations : 31 sets max. Note: When the RS-422A is used, available only for four wire system.			
Debugging function	Sampling trace	At normal [Using the 2k bytes of internal work area] : Data can be traced for (relay 15 points + register 6 bytes) × 256 times, or relay 15 points × 1024 times at an arbitrate period. (10 ms units) At expansion [Using the 64k bytes of file register] : Data can be traced for (relay 15 points + register 6 bytes) × 8192 times, or relay 15 points × 32768 times at an arbitrate period. (10 ms units)				
	Break function	Available setting any program address as a break point.				
	Step operation	Can execute program in one instructions unit.				
	N scan operation	Execute operation each time the specified number of scans (1 to 9999).				
	Available forced ON/OFF I/O relay	Available switch ON/OFF for I/O relay regardless of the input signal or operation result.				
Weight		Approx. 270 g	Approx. 280			
Accessories		One instruction manual				

11-4 Specifications of I/O module

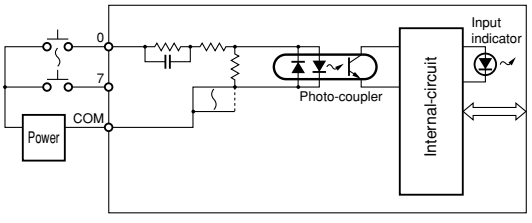
	Model name	Reference page
Input	JW-201N	11-8
	JW-202N	11-9
	JW-203N	11-10
	JW-211NA	11-11
	JW-212NA	11-12
	JW-214NA	11-13
	JW-234N	11-14

	Model name	Reference page
Output	JW-202S	11-15
	JW-203S	11-16
	JW-204S	11-17
	JW-212SA	11-18
	JW-213SA	11-19
	JW-214SA	11-20
	JW-232S	11-21

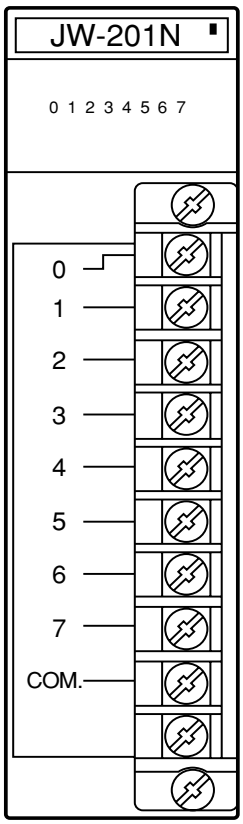
	Model name	Reference page
I/O	JW-232M	11-22
Special I/O	JW-264N	11-23
	JW-262S	11-24

[1] Input module

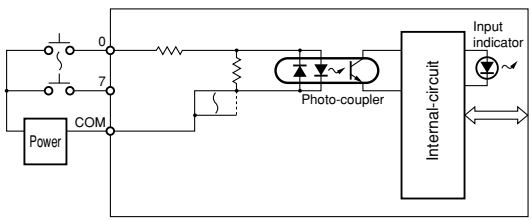
(1) JW-201N

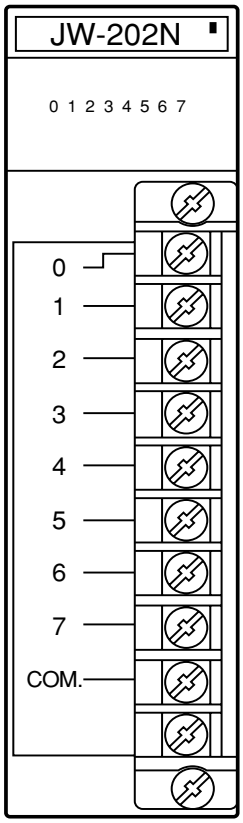
Model name	AC input module : JW-201N
No. of input	8 points
Rated input voltage	100/120 VAC (50/60Hz)
Input voltage range	85 to 132 VAC (50/60Hz, waveform distortion : 5% or less)
Rated input current	10 mA TYP. (100 VAC, 60Hz) 8.4 mA TYP. (100 VAC, 50Hz)
Input impedance	10 k ohm (TYP., 60Hz), 12k ohm (TYP, 50Hz)
Surge current	Max. 480 mA, 0.2 ms (at 132 VAC peak ON)
Input ON level	80 V/7 mA or less
Input OFF level	30 V/3 mA or more
Response time (module alone)	OFF to ON : 30 ms or less (100 VAC) ON to OFF : 40 ms or less (100 VAC)
Internal current consumption (5 VDC)	40 mA max.
Operation indication	LED lights at ON condition
External wire connection system	10 P detachable terminal block (M3.5 × 7 screws, blue)
Dielectrical strength	1500 VAC for 1 minute (between input terminal and secondary circuit)
Insulation resistance	500 VDC, 10 M ohm or more (between input terminal and secondary circuit)
Insulation system	By photo-coupler
Common system	1 common line for 8 points
Weight	Approx. 180g
Circuit diagram	

Front view

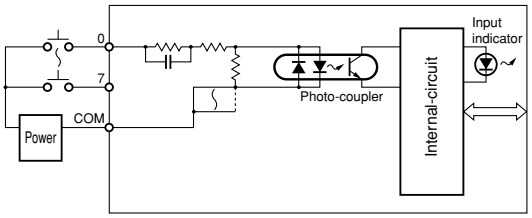


(2) JW-202N

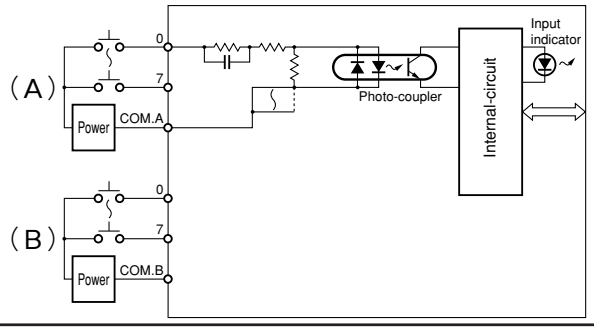
Model name	DC input module (low speed type) : JW-202N	Front view
No. of input	8 points	
Rated input voltage	12/24 VDC	
Input voltage range	10.5 to 26.4 VDC (ripple rate at 24 VDC : 15% or less) (ripple rate at 12 VDC: 5% or less)	
Rated input current	7.5 mA TYP. (24 VDC) 3.5 mA TYP. (12 VDC)	
Input impedance	3.5 k ohm TYP	
Surge current	———	
Input ON level	10.5 V/3 mA or less	
Input OFF level	5 V/1.5 mA or more	
Response time (module alone)	OFF to ON : 10 ms or less (12/24 VDC) ON to OFF : 10 ms or less (12/24 VDC)	
Internal current consumption (5 VDC)	40 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	10 P detachable terminal block (M3.5 × 7 screws, blue)	
Dielectrical strength	1000 VAC for 1 minute (between input terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between input terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points (No polarity)	
Weight	Approx. 170g	
Circuit diagram		

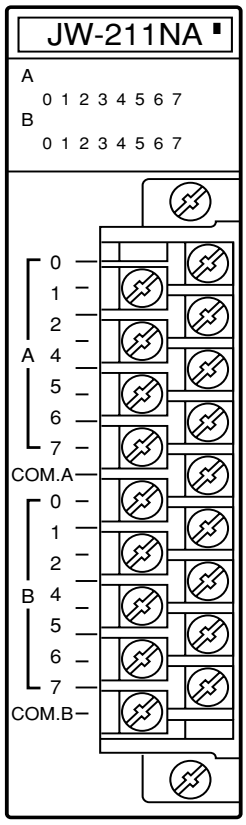


(3) JW-203N

Model name	AC input module : JW-203N	Front view
No. of input	8 points	
Rated input voltage	200/240 VAC (50/60 Hz)	
Input voltage range	170 to 250 VAC (50/60 Hz, waveform distortion : 5% or less)	
Rated input current	9.1 mA TYP. (200 VAC, 60 Hz) 8 mA TYP. (200 VAC, 50 Hz)	
Input impedance	22 k ohm (TYP., 60 Hz), 25k ohm (TYP, 50 Hz)	
Surge current	Max. 500 mA, 0.2 ms (at 250 VAC peak ON)	
Input ON level	170 V/7 mA or less	
Input OFF level	70 V/3 mA or more	
Response time (module alone)	OFF to ON : 30 ms or less (200 VAC) ON to OFF : 40 ms or less (200 VAC)	
Internal current consumption (5 VDC)	40 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	10 P detachable terminal block (M3.5 × 7 screws, blue)	
Dielectrical strength	1500 VAC for 1 minute (between input terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between input terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points	
Weight	Approx. 180g	
Circuit diagram		

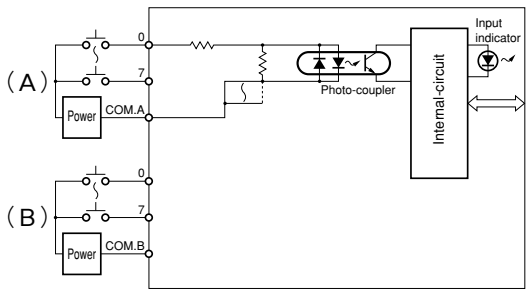
(4) JW-211NA

Model name	AC input module : JW-211NA	Front view
No. of input	16 points	
Rated input voltage	100/120 VAC (50/60 Hz)	
Input voltage range	85 to 132 VAC (50/60 Hz, waveform distortion : 5% or less)	
Rated input current	10 mA TYP. (100 VAC, 60 Hz) 8.4 mA TYP. (100 VAC, 50 Hz)	
Input impedance	10 k ohm (TYP., 60 Hz), 12k ohm (TYP, 50 Hz)	
Surge current	Max. 480 mA, 0.2 ms (at 132 VAC peak)	
Input ON level	80 V/7 mA or less	
Input OFF level	30 V/3 mA or more	
Response time (module alone)	OFF to ON : 30 ms or less (100 VAC) ON to OFF : 40 ms or less (100 VAC)	
Internal current consumption (5 VDC)	60 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	10 P detachable terminal block (M3.5 × 7 screws, blue)	
Dielectrical strength	1500 VAC for 1 minute (between input terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between input terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points	
Weight	Approx. 220g	
Circuit diagram		



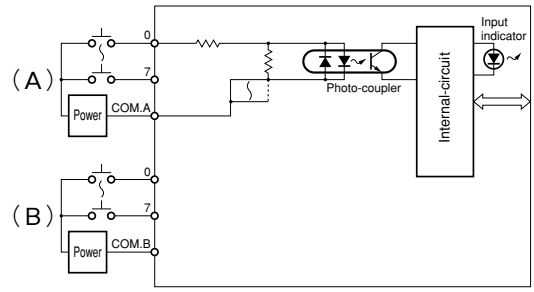
The JW-211NA covers functions of its previous model (JW-211N). In addition to the inheriting functions, view angel of the LED display (top of the module) is improved to wide-angle display type.

(5) JW-212NA

Model name	DC input module : JW-212NA	Front view
No. of input	16 points	
Rated input voltage	12/24 VDC	
Input voltage range	10.5 to 26.4 VDC (ripple rate at 24 VDC : 15% or less) (ripple rate at 12 VDC : 5% or less)	
Rated input current	7.5 mA TYP. (24 VDC) 3.5 mA TYP. (12 VDC)	
Input impedance	3.3 k ohm TYP.	
Surge current	———	
Input ON level	10.5 V/3 mA or less	
Input OFF level	5 V/1.5 mA or more	
Response time (module alone)	OFF to ON : 10 ms or less (12/24 VDC) ON to OFF : 10 ms or less (12/24 VDC)	
Internal current consumption (5 VDC)	60 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	18 P detachable terminal block (M3.5 × 7 screws, blue)	
Dielectrical strength	1000 VAC for 1 minute (between input terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between input terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points (no polarity)	
Weight	Approx. 210g	
Circuit diagram		

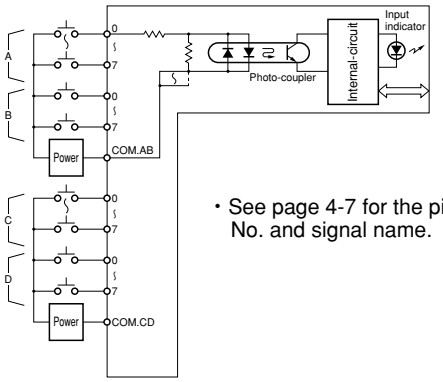
The JW-212NA covers functions of its previous model (JW-212N). In addition to the inheriting functions, view angel of the LED display (top of the module) is improved to wide-angle display type.

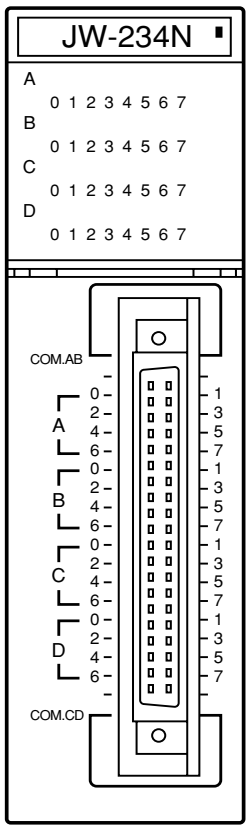
(6) JW-214NA

Model name	DC input module(high speed type) : JW-214NA	Front view
No. of input	16 points	
Rated input voltage	12/24 VDC	
Input voltage range	10.5 to 26.4 VDC (ripple rate or at 24 VDC : 15% or less) (ripple rate at 12 VDC : 5% or less)	
Rated input current	7.5 mA TYP. (24 VDC) 3.5 mA TYP. (12 VDC)	
Input impedance	3.3 k ohm TYP.	
Surge current	———	
Input ON level	10.5 V/3 mA or less	
Input OFF level	5 V/1.5 mA or more	
Response time (module alone)	OFF to ON : 0.5 ms or less (12/24 VDC) ON to OFF : 1 ms or less (12/24 VDC)	
Internal current consumption (5 VDC)	60 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	18 P detachable terminal block (M3.5 × 7 screws, blue)	
Dielectrical strength	1000 VAC for 1 minute (between input terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between input terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points (no polarity)	
Weight	Approx. 210g	
Circuit diagram		

The JW-214NA covers functions of its previous model (JW-214N). In addition to the inheriting functions, view angel of the LED display (top of the module) is improved to wide-angle display type.

(7) JW-234N

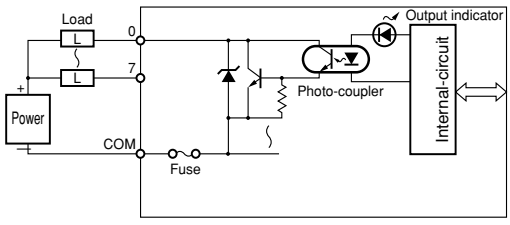
Model name	DC input module : JW-234N	Front view
No. of input	32 points *	
Rated input voltage	12/24 VDC	
Input voltage range	10.5 to 26.4 VDC (ripple rater at 24 VDC : 15% or less) (ripple rate at 12 VDC : 5% or less)	
Rated input current	7 mA TYP. (24 VDC) 3.5 mA TYP. (12 VDC)	
Input impedance	3.5 k ohm TYP.	
Surge current	———	
Input ON level	10.5 V/3 mA or less	
Input OFF level	5 V/1.5 mA or more	
Response time (module alone)	OFF to ON : 0.5 ms or less (12/24 VDC) ON to OFF : 1.5 ms or less (12/24 VDC)	
Internal current consumption (5 VDC)	80 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	40 P connector (soldering) Applicable wire size : AW23 to 26 (0.26 to 0.12 mm^2)	
Dielectrical strength	1000 VAC for 1 minute (between input terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between input terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 16 points (no polarity)	
Weight	Approx. 410g	
Circuit diagram	 ・See page 4-7 for the pin No. and signal name.	
Accessories	40 P connector (soldering) × 1	

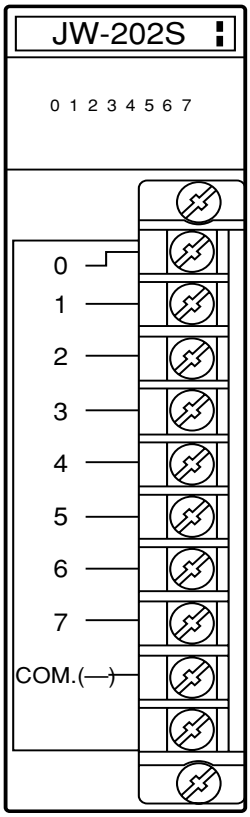


* When using at ambient temperature of 45 to 55°C in 24 VDC, use that same time input ON no. of points should be less than 10 points per common. However, constraint do not have in case of using for 12 VDC.

[2] Output module

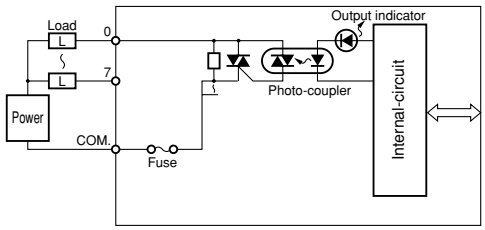
(1) JW-202S

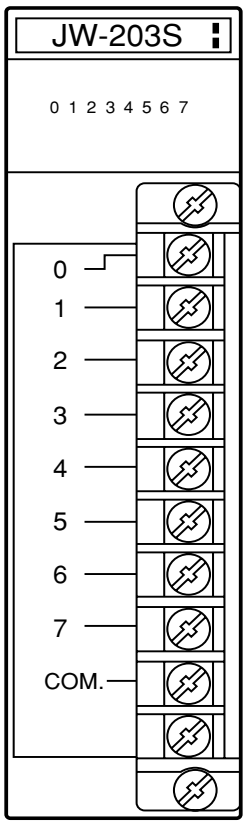
Model name	DC output module (sink output) : JW-202S	Front view
No. of output	8 points	
Rated load voltage	5/12/24 VDC	
Load voltage range	4.75 to 27 VDC	
Rated max. load current	1 A/point, 4 A/common *	
Allowable surge current	4 A (100 ms)	
Min. load current	———	
OFF leak current	0.2 mA or less	
ON voltage drop	1.4 V or less (1 A)	
Response time (module alone)	OFF to ON : 1 ms or less (resistance load) ON to OFF : 1 ms or less (resistance load)	
Surge killer	Zener diode	
Rated capacity of fuse element	4 A/125 V (one per common) Using fuse : 125 VAC 4 A (MQ2 4 A [SOC])	
Internal current consumption (5 VDC)	190 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	10 P detachable terminal block, (M 3.5 × 7 screws, red)	
Dielectrical strength	1000 VAC for 1 minute (between output terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between output terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points (no polarity)	
Weight	Approx. 180g	
Circuit diagram		
Accessories	Fuse element 125 VAC 4A × 1	



* When the module receives more than 0.3 A inductive load, use the module less than 30 times/minute open-close frequency (approx. ON for 1 sec., OFF for 1 sec). When the module receives more than 0.5 A of load current, be sure to install surge absorbing measures at load side.

(2) JW-203S

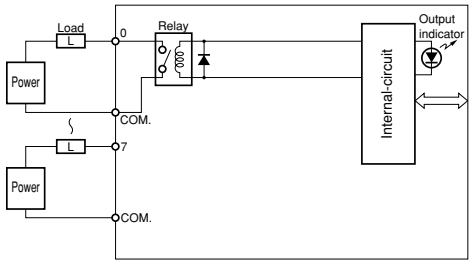
Model name	AC output module : JW-203S	Front view
No. of output	8 points	
Rated load voltage	100 to 240 VAC (50/60Hz)	
Load voltage range	15 to 250 VAC (50/60 Hz, waveform distortion: less than 5%)	
Rated max. load current	1 A/point, 4 A/common *1	
Allowable surge current	8 A (100 ms)	
Min. load current	30 mA *2	
OFF leak current	1.5 mA or less (120 VAC, 25°C), 3 mA or less (240 VAC, 25°C)	
ON voltage drop	1.6 V or less (at 1 A)	
Response time (module alone)	OFF to ON : 1 ms or less ON to OFF : 1 ms plus half power frequency or less	
Surge killer	Capacitive valister, snubber	
Rated capacity of fuse element	4 A/125 V (one per common) Using fuse : 250 VAC 4 A (SS2 4 A [SOC])	
Internal current consumption (5 VDC)	130 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	10 P detachable terminal block, (M 3.5 × 7 screws, red)	
Dielectrical strength	1500 VAC for 1 minute (between output terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between output terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points	
Weight	Approx. 220g	
Circuit diagram		
Accessories	Fuse element : 125 VAC 4A × 1	

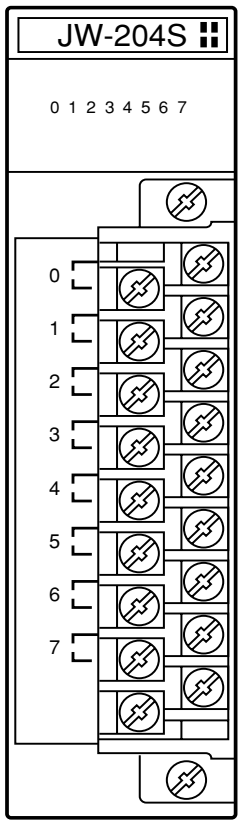


*1 When ambient temperature is more than 50°C, make sure that load current should be less than 0.8 A/point and 3.2 A/common.

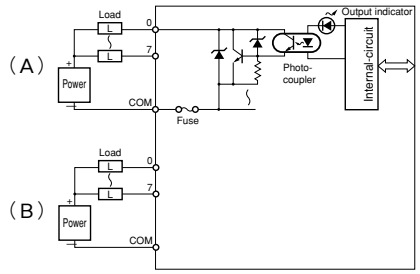
*2 When load current at hold is less than 30 mA, the module may not be able to be switched OFF in certain load situations. In these cases, connect a bleeder parallel to the load line to increase the load current to more than 30 mA level.

(3) JW-204S

Model name		Relay output module (separated common) : JW-204S	Front view
No. of output		8 points	
Max. open-close voltage and current		250 VAC/30 VDC, 2A/point (resistance load)	
Min. load		5 VDC, 10 mA	
Ope-ration life	Mechanical	20,000,000 times or more	
	Electrial	1. Max. open-close voltage and current load : 100,000 times or more 2. Inductive load (250 VAC, 0.5 A (COS ϕ = 0.4)) : 200,000 times or more 3. Inductive load (30 VDC, 0.5 A (T = 7 ms)) : 20,0000 times or more	
Response time (module alone)		OFF to ON : 10 ms or less ON to OFF : 10 ms or less	
Surge killer		———	
Rated capacity of fuse element		———	
Internal current consumption (5 VDC)		430 mA max.	
Operation indication		LED lights at ON condition	
External wire connection system		18 P detachable terminal block, (M 3.5 × 7 screws, red)	
Dielectrical strength		1500 VAC for 1 minute (between output terminal and secondary circuit)	
Insulation resistance		500 VDC, 10 M ohm or more (between output terminal and secondary circuit)	
Insulation system		By relay	
Common system		1 common line for 1 point (separated common)	
Weight		Approx. 220g	
Circuit diagram			



(4) JW-212SA

Model name	DC output module (sink output) : JW-212SA	Front view
No. of output	16 points	
Rated load voltage	5/12/24 VDC	
Load voltage range	4.75 to 27 VDC	
Rated max. load current	0.5 A/point, 2 A/common *1	
Allowable surge current	1 A (100 ms)	
Min. load current	---	
OFF leak current	0.2 mA or less	
ON voltage drop	1.2 V or less (0.3 A)	
Response time (module alone)	OFF to ON : 1 ms or less (resistance load) ON to OFF : 1 ms or less (resistance load)	
Surge killer	Zener diode (built-in between C and B of transistor)	
Rated capacity of fuse element	Built-in 3.15 A fuse (unable replacement) /common	
Blown fuse indication	LED display	
Internal current consumption (5 VDC)	60 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	18 P detachable terminal block, (M 3.5 x 7 screws, red)	
Dielectrical strength	1000 VAC for 1 minute (between output terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between output terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points	
Weight	Approx. 200g	
Circuit diagram		

* 1: When load current exceeds 0.3 A, install a diode as surge absorber at load side.

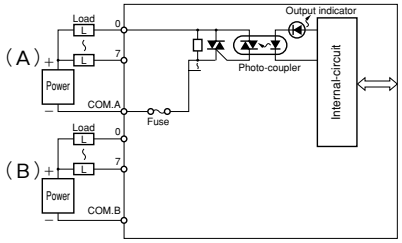
The JW-212SA covers functions of its previous model (JW-212S). In addition to the inheriting functions, view angel of the LED display (top of the module) is improved to wide-angle display type.

- Added the blown fuse indicator (FUSE) on the LED display.
- Changed specifications of the integrated fuse.

Item	New model (JW-212SA)	Previous model (JW-212S)
Blown fuse indication (LED display)	Available (FUSE) *2	Not avaialble
Fuse specifications (1 common)	3.15 A	3 A

*2: The JW-212SA displays fuse blow (FUSE) using an LED. However, this is only indication and the JW20H/30H control module cannot detect this fuse blow. In addition, the users cannot replace the installed fuses. Ask our sales agent for replacement of the fuses.

(5) JW-213SA

Model name	DC output module (sink output) : JW-213SA	Front view
No. of output	16 points	
Rated load voltage	100 to 240 VAC (50/60 Hz)	
Load voltage range	15 to 250 VAC (50/60 Hz, waveform distortion: less tha 5%) *3	
Rated max. load current	1.0 A/point, 2 A/common *1	
Allowable surge current	6 A (100 ms)	
Min. load current	15 mA *2	
OFF leak current	1.5 mA or less (120 VAC, 25° C), 3 mA or less (240 VAC, 25° C)	
ON voltage drop	1.6 V or less (0.3 A)	
Response time (module alone)	OFF to ON : 1 ms or less ON to OFF : 1 ms pulse half power frequency or less	
Surge killer	Capacitive varistor	
Rated capacity of fuse element	Built-in 3.15 A fuse (unable replacement) /common	
Blown fuse indication	LED display	
Internal current consumption (5 VDC)	260 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	18 P detachable terminal block, (M 3.5 x 7 screws, red)	
Dielectrical strength	1500 VAC for 1 minute (between output terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between output terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 8 points	
Weight	Approx. 210g	
Circuit diagram		

*1 When ambient temperature is more than 45°C, make sure that load current should be less than 0.7 A/point.

*2 When load current at hold is less than 15 mA, the module may not be able to be switched OFF in certain load situations. In these cases, connect a bleeder parallel to the load line to increase the load current to more than 15 mA level.

*3: When supply power voltage is less than 85 VAC, the module may not detect fuse blow.

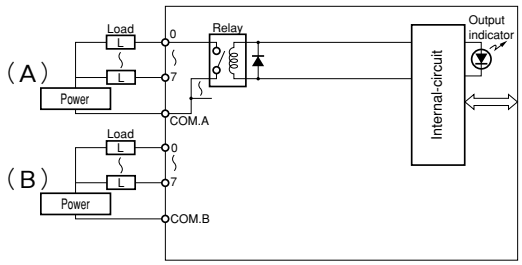
The JW-213SA covers functions of its previous model (JW-213S). In addition to the inheriting functions, view angel of the LED display (top of the module) is improved to wide-angle display type.

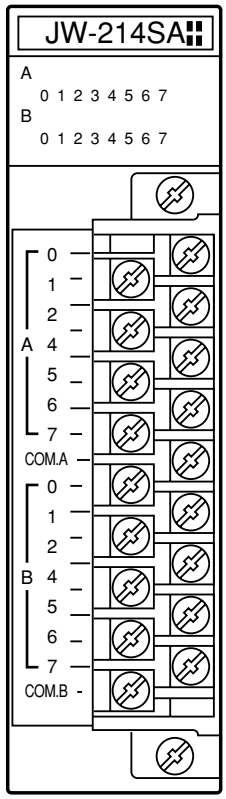
- Added the blown fuse indicator (FUSE) on the LED display. - Changed specifications of the integrated fuse.- Changed rated maximum load current.

Item	New model (JW-213SA)	Previous model (JW-213S)
Blown fuse indication (LED display)	Available (FUSE) *2	Not avaialble
Fuse specifications (1 common)	3.15 A	3 A
Maximum load current	1.0 A/point, 2A/common	0.5 A/point, 2A/common

*4: The JW-213SA displays fuse blow (FUSE) using an LED. However, this is only indication and the JW20H/30H control module cannot detect this fuse blow. In addition, the users cannot replace the installed fuses. Ask our sales agent for replacement of the fuses.

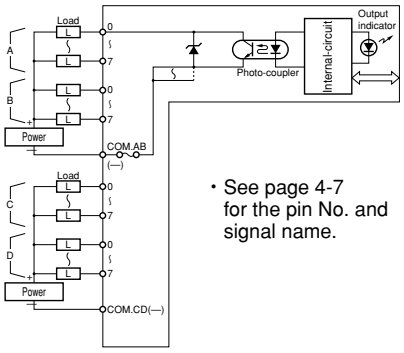
(6) JW-214SA

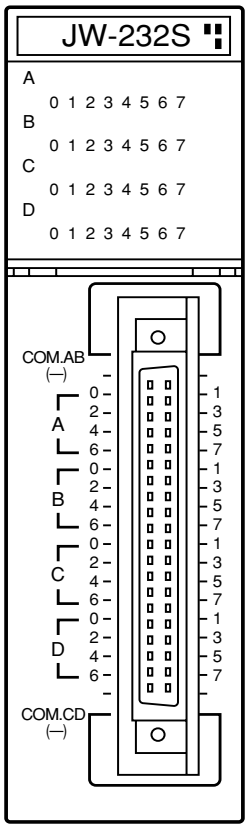
Model name		Relay output module : JW-214SA	Front view
No. of output		16 points	
Max. open-close voltage and current		250 VAC/30 VDC, 2A/points, 5A/common	
Min. load		5 VDC, 10 mA	
Ope-ration life	Mechanical	20,000,000 times or more	
	Electrial	1. Max. open-close voltage and current load : 100,000 times or more 2. Inductive load (250 VAC, 0.5 A (COS ϕ = 0.4)) : 200,000 times or more 3. Inductive load (30 VDC, 0.5 A (T = 7 ms)) : 200,000 times or more	
Response time (module alone)		OFF to ON : 10 ms or less ON to OFF : 10 ms or less	
Surge killer		———	
Rated capacity of fuse element		———	
Blown fuse indicator		———	
Internal current consumption (5 VDC)		550 mA max.	
Operation indication		LED lights at ON condition	
External wire connection system		18 P detachable terminal block, (M 3.5 × 7 screws, red)	
Dielectrical strength		1500 VAC for 1 minute (between output terminal and secondary circuit)	
Insulation resistance		500 VDC, 10 M ohm or more (between output terminal and secondary circuit)	
Insulation system		By relay	
Common system		1 common line for 8 points	
Weight		Approx. 240g	
Circuit diagram			



The JW-214SA covers functions of its previous model (JW-214S). In addition to the inheriting functions, view angel of the LED display (top of the module) is improved to wide-angle display type.

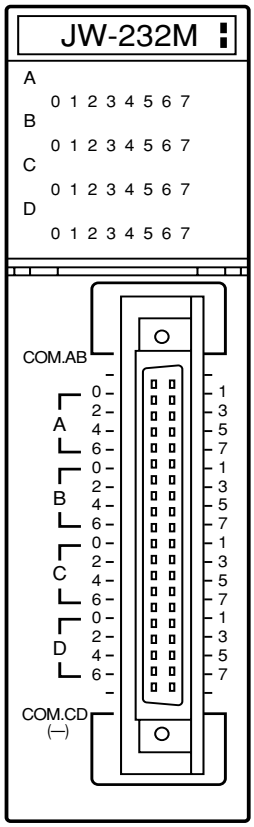
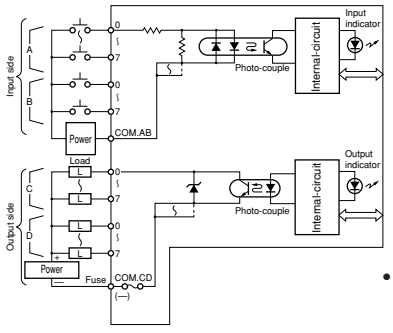
(7) JW-232S

Model name	DC output module (sink output) : JW-232S	Front view
No. of output	32 points	
Rated load voltage	5/12/24 VDC	
Load voltage range	4.75 to 30 VDC	
Rated max. load current	0.1 A/point, 1.6 A/common *	
Allowable surge current	0.15 A (10 ms)	
Min. load current	———	
OFF leak current	0.2 mA or less	
ON voltage drop	1.3 V or less (0.1 A)	
Response time (module alone)	OFF to ON : 1 ms or less ON to OFF : 1 ms or less (with resistance load)	
Surge killer	Zener diode	
Rated capacity of fuse element	Built-in 2 A fuse (unable replacement)/common	
Internal current consumption (5 VDC)	320 mA max.	
Operation indication	LED lights at ON condition	
External wire connection system	40 P connector (soldering) Applicable wire size: AWG23 to 26 (0.26 to 0.12 mm^2)	
Dielectrical strength	1000 VAC for 1 minute (between output terminal and secondary circuit)	
Insulation resistance	500 VDC, 10 M ohm or more (between output terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 16 points	
Weight	Approx. 410g	
Circuit diagram	 • See page 4-7 for the pin No. and signal name.	
Accessories	40P connector (soldering) × 1	



* When using at ambient temperature of 45 to 55°C, use within 1 A per common terminal.

[3] I/O module JW-232M

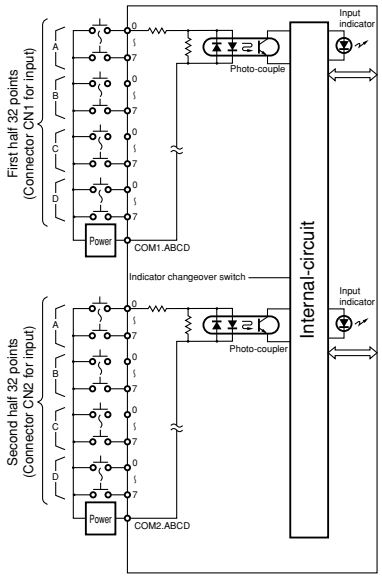
			Front view
Input port	Model name	DC I/O module (sink output) : JW-232M	
	Rated input voltage	16 points *1	
	Rated input voltage	12/24 VDC	
	Input voltage range	10.5 to 26.4 VDC (ripple rate at 24 VDC : 15% or less / ripple rate at 12 VDC : 5% or less)	
	Rated input current	7 mA TYP. (24 VDC), 3.3 mA TYP. (12 VDC)	
	Input impedance	3.5k ohm TYP.	
	Surge current	———	
	Input ON level	10.5 V/3 mA or less	
	Input OFF level	5 V/1.5 mA or more	
	Response time (module alone)	OFF to ON : 0.5 ms or less ON to OFF : 1.5 ms or less	
Output port	No. of output	16 points	
	Rated load voltage	5/12/24 VDC	
	Load voltage range	4.75 to 30 VDC	
	Rated max. load current	0.1 A/point, 1.6 A/common *2	
	Allowable surge current	0.15 A (10 ms)	
	Min. load current	———	
	OFF leak current	0.2 mA or less	
	ON voltage drop	1.3 V or less (0.1 A)	
	Response time (module alone)	OFF to ON : 1 ms or less ON to OFF : 1 ms or less (with resistance load)	
	Surge killer	Zener diode	
	Rated capacity of fuse element	Built-in 2 A fuse (unable replacement)/common	
Internal current consumption (5 VDC)		200 mA max.	
Operation indication		LED lights at ON condition	
External wire connection system		40 P connector (soldering) Applicable wire size: AWG23 to 26 (0.26 to 0.12 mm^2)	
Dielectrical strength		1000 VAC for 1 minute (between I/O terminal and secondary circuit)	
Insulation resistance		500 VDC, 10 M ohm or more (between I/O terminal and secondary circuit)	
Insulation system		By photo-coupler	
Common system		1 common line for 16 points (no polarity for input)	
Weight		Approx. 410g	
Circuit diagram		 • See page 4-7 for pin No. and signal name.	
Accessories		40 P connector (soldering) × 1	

*1 When using at ambient temperature of 45 to 55°C in 24 VDC, use that same time input ON no. of points should be less than 10 points per common.

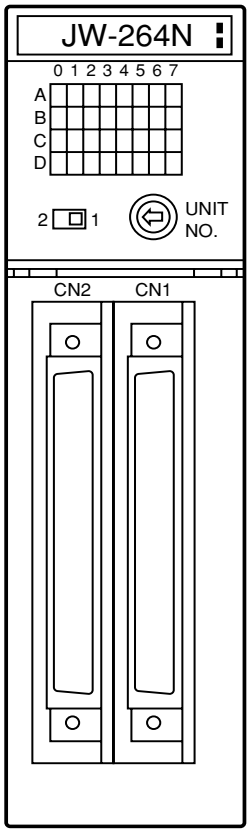
*2 When using at ambient temperature of 45 to 55°C, use within 1 A per common terminal.

[4] Special I/O module

(1) JW-264N

Model name	DC output module : JW-264N
No. of input	64 points (Allocation of the first half 64 points of the relay for special module.) *
Number of I/O occupied points	I/O relay : 16 points (dummy) Relay for special module : 128 points
Rated input voltage	24 VDC
Input voltage range	20 to 26.4 VDC
Rated input current	4.1 mA (24 VDC)
Input impedance	5.9 k ohm
Surge current	———
Input ON level	18 V/3 mA or less
Input OFF level	8 V/1.5 mA or more
Response time (module alone)	OFF to ON : 0.5 ms or less ON to OFF : 1 ms less
Internal current consumption (5 VDC)	60 mA max. (At all points ON for input.)
Operation indication	Indicator lamps at ON condition (The simulataneous indication is 32 points max., first half 32 points and second half 32 points are changed over by the indicator changeover switch.)
External wire connection system	Applicable wire size using connection connector (accessories) : AWG23 to 26 (0.26 to 0.12 mm^2)
Dielectrical strength	1000 VAC for 1 minute (between input terminal and secondary circuit)
Insulation resistance	500 VDC, 10M ohm or more (between input terminal and secondary circuit)
Insulation system	By photo-coupler
Common system	1 common line for 32 points (no polarity)
Weight	Approx. 220g
Circuit diagram	
Accessories	40 P connector (soldering) × 2

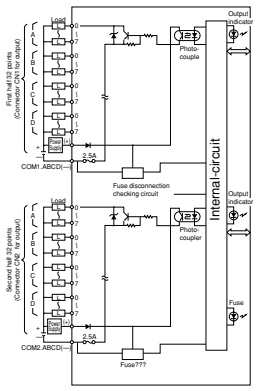
Front view

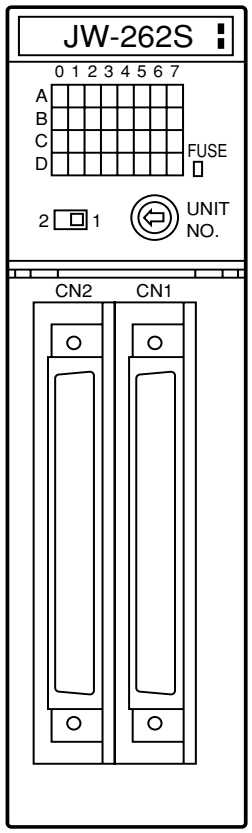


* When using at ambient temperature of 45 to 55°C, use within 1 A per common terminal.

See page 4-8 for the pin No. of connector and signal name.

(2) JW-262S

Model name	DC output module (sink output) : JW-262S	Front view
No. of output	64 points (Allocation of the first half 64 points of the relay for special module.)	
Number of I/O occupied points	I/O relay : 16 points (dummy) Relay for special module: 128 points	
Rated load voltage	5/12/24 VDC	
Load voltage range	4.75 to 26.4 VDC	
Rated max. load current	0.1 A/point, 2 A/common *	
Allowable surge current	0.15 A (100 ms)	
Min. load current	———	
OFF leak current	0.2 mA or less	
ON voltage drop	1.2 V or less (0.1A)	
Response time (module alone)	OFF to ON : 0.5 ms or less ON to OFF : 1 ms or less (with 0.1A resistance load)	
Internal current consumption (5 VDC)	300 mA max. (At all points ON for output.)	
Surge killer	Zener diode	
Rated capacity of fuse element	Built-in 2.5A fuse (unable replacement). Melt-down detection function is provided. (When melted down or external power source is turned OFF, the LED lights.)	
Operation indication	Indicator lamps at ON condition (The simulataneous indication is 32 points max., first half 32 points and second half 32 points are changed over by the indication changeover switch.)	
External energizer	5/12/24 V (200 mA max.) Use same source with load source	
External wire connection system	Applicable wire size using connection connector (accessories) : AWG23 to 26 (0.26 to 0.12 mm^2)	
Dielectrical strength	1000 VAC for 1 minute (between input terminal and secondary circuit)	
Insulation resistance	500 VDC, 10M ohm or more (between input terminal and secondary circuit)	
Insulation system	By photo-coupler	
Common system	1 common line for 32 points (slot common)	
Weight	Approx. 220g	
Circuit diagram		
Accessories	40 P connector (soldering) × 2	



* When the load power source is 5/12 VDC, the load current per point decreases.

Rated power	5 VDC	12 VDC	24 VDC
The load current per point	30 mA max.	60mA max.	100 mA max.

See page 4-8 for the pin No. of connector and signal name.

11-5 Specifications of power supply module

[1] JW-21PU/22PU/31PU

Items	Specifications			
	JW-21PU	JW-22PU	JW-31PU (UL/CSA approved)	
Installed position	Slot for the Power supply module of basic/expansion rack panel			
Input voltage	85 to 264 VAC (47 to 63Hz)	* 20.4 to 32 VDC	85 to 132 VAC (47 to 63Hz)	
Power consumption	30W (60 VA) or less	30W or less	30W (60 VA) or less (At output current 3.5A)	
Surge current	40A or less (200 VAC)	40A or less (32 VAC)	20A or less	
Leakage current	1mA or less (at 100 VAC) 3.5mA or less (at 200 VAC)	———	1mA or less (at 100 VAC)	
Output voltage	5 VDC			
Output current	3.5A			
Rated output current	0 to 3.5A			
Output hold time	10 ms or more			
Protection circuit	Overcurrent protection	Drooping automatic reset system		
	Overvoltage protection	Shut-off type manual reset system		
Halt output	Function	Relay output becoming OFF when the control module stops.		
	Load voltage	100/200 VAC (50/60Hz) 30 VDC	100 VAC (50/60Hz) 30 VDC	
	Load current	1A max.		
	Leakage current	1mA (200 VAC)	1mA or less (100 VAC)	
Insuration resistance	500 VDC 10M ohm or more			
Dielectrical strength	1500 VAC for 1 minute	1000 VAC for 1 minute	1500 VAC for 1 minute	
Indication	POWER LED (green), RUN LED (green)			
External wire connection system	6P terminal block			
Operation ambient temperature	0 to 55° C			
Storage temperature	– 20 to 70° C			
Operation ambient humidity	35 to 90 %RH (without dew condensation)			
Operation atmosphere	Free from corrosive gas			
Vibration resistance	JIS C 0911 or equivalent - Multiple vibration width: 0.15 mm (10 to 57 Hz), 9.8 m/s^2 (57 to 150 Hz), Number of sweep: (1 octave/minute), three directions (X, Y, and Z)			
Shock resistance	JIS C 0912 or equivalent 147 m/s^2 (3 times in each X, Y and Z directions)			
Noise immunity	1000 Vp-p 1μs (by noise simulator between the power line and rack panel)			
Weight	Approx. 330 g	Approx. 300 g	Approx. 330 g	

* As for DC input power source, use power source of 20.4 to 32 VDC (ripple rate 20% or less; however, ripple upper limit: 32 V or less, lower limit : 20.4 V or more).

[2] JW-33PU (UL/CSA/CE applied model)

Items		Specifications
Installed position		Slot for the power supply module of basic/expansion rack panel
Input voltage		85 to 264 VAC (47 to 63 Hz)
Power consumption		70 VA or less
Surge current		40 A or less (200 VAC)
Leakage current		1mA or less (at 100 VAC), 3.5mA or less (at 200 VAC)
Output voltage		5 VDC
Output current		4.5 A
Rated output current		0 to 4.5A
Output hold time		10 ms or more
Protection circuit	Overcurrent	Dropping autiomatic reset system
	Overvoltage	Shut-OFF type manual reset system
Halt output	Function	Relay output becoming OFF when the control module stops.
	Load voltage	100/200 VAC (50/60 Hz),30 VDC
	Load current	1A max.
	Leakage current	1 mA (200 VAC)
Insulation resistance		500 VDC, 10M ohms or more
Dielectical strength		1500 VAC for 1 minute
Display		POWER LED (green), RUN LED (green)
External wire connection		6P terminal block
Operation temperature		0 to 55 degrees
Storage temperature		-20 to 70 degrees
Operation ambient humidity		35 to 90%RH (without condensation)
Operation atmosphere		Free from corrosive gas
Vibration resistance		JIS C 0911 or equivalent - Multiple vibration width: 0.15 mm (10 to 57 Hz), 9.8 m/s^2 (57 to 150 Hz), Number of sweep: (1 octave/minute), three directions (X, Y, and Z)
Shock resistance		JIS C 0912 or equivalent, 147m/s^2 (3 times in each X, Y and Z directions)
Noise immunity		1000 Vp-p 1μs (by noise simulator between the power line and rack panel)
Weight		Approx. 410g

11-6 Specifications of I/O bus expansion adapter

Items	Specifications	
	JW-31EA	JW-32EA
Rack panel	JW-34KB/36KB/38KB	JW-34ZB/36ZB/38ZB
Cable total length	Total length from JW-31EA is 50m	
Number of rack panel connected	Max. 8 sets in total of 1 basic rack panel and 7 expansion rack panel.	
Weight	Approx. 300g	Approx. 300g
Accessories	Termination connector : 1	————

11-7 Specifications of rack panel

Items		Specifications		
		JW-24KB	JW-26KB	JW-28KB
No. of slot	Power supply module	1	1	1
	Control module	1	1	1
	I/O module	4	6	8
Installation of JW-31EA		Unavailable	Unavailable	Unavailable
Weight		Approx. 720g	Approx. 870g	Approx. 1000g

Items		Specifications		
		JW-34KB	JW-36KB	JW-38KB
No. of slot	Power supply module	1	1	1
	Control module	1	1	1
	I/O module	4	6	8
Installation of JW-31EA		Available	Available	Available
Weight		Approx. 830g	Approx. 1020g	Approx. 1220g

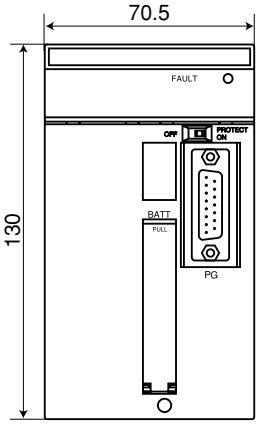
11-8 Specifications of expansion rack panel

Items		Specifications		
		JW-34ZB	JW-36ZB	JW-38ZB
No. of slot	Power supply module	1	1	1
	I/O module	4	6	8
Installation of JW-32EA		Available	Available	Available
Weight		Approx. 630g	Approx. 830g	Approx. 1020g
Accessories		Side board for I/O module : 1		

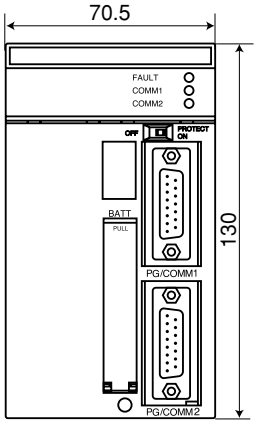
11-9 Outline dimension drawings (unit:mm)

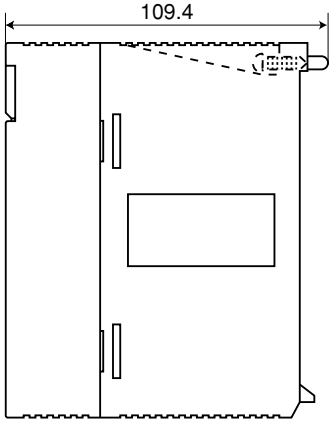
[1] Control module

JW-31CUH1



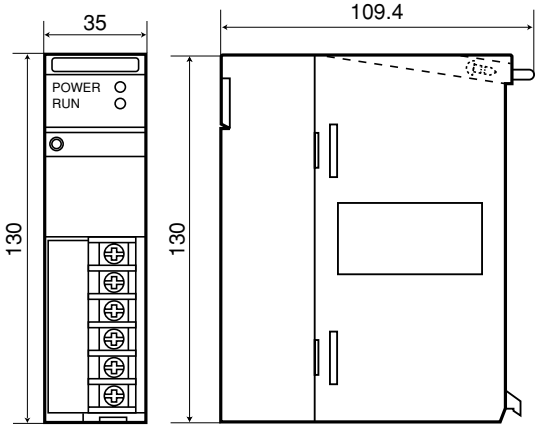
JW-32CUH1
JW-33CUH1/2/3



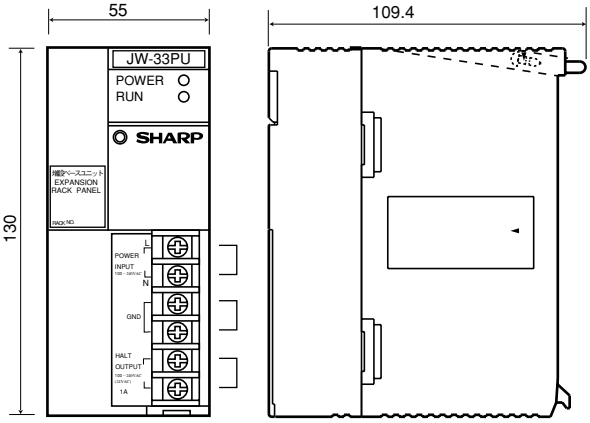


[2] Power supply module

(1) JW-21PU/22PU/31PU

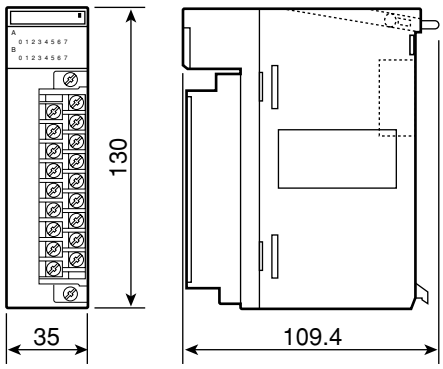


(2) JW-33PU

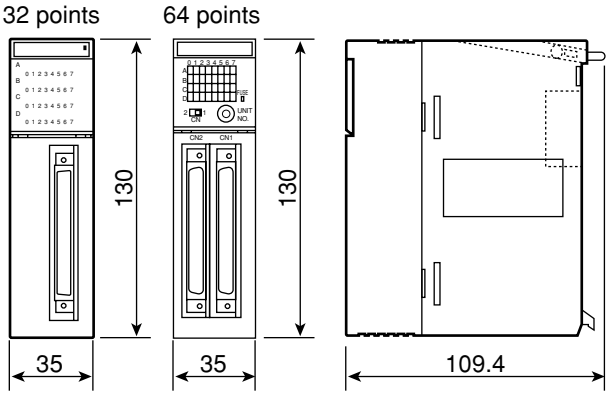


[3] I/O module (As for special/option module, see respective Instruction manual)

(1) 8/16 points module

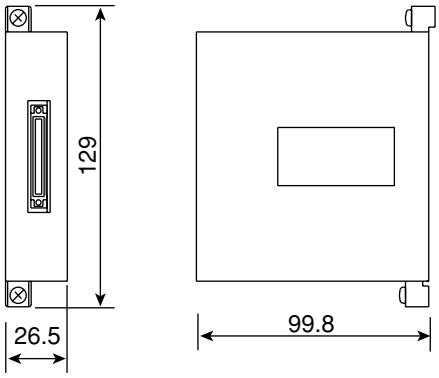


(2) 32/64 points module

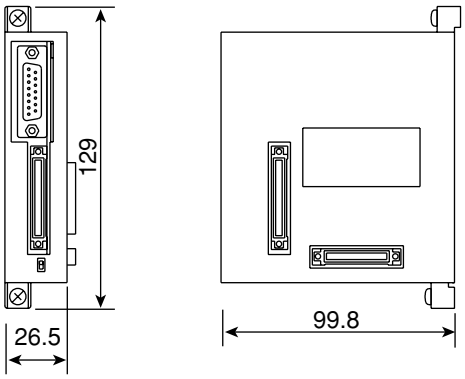


[4] I/O bus expansion adapter

(1) JW-31EA

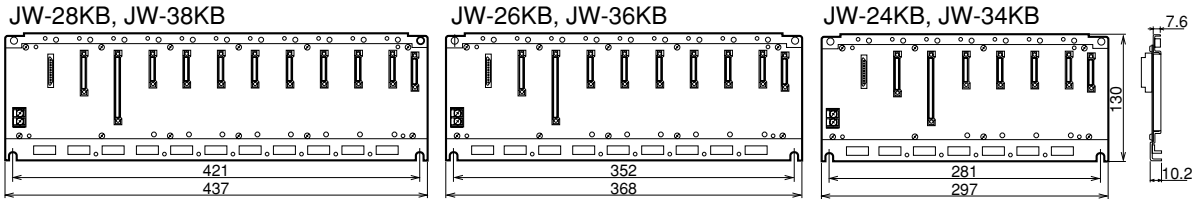


(2) JW-32EA

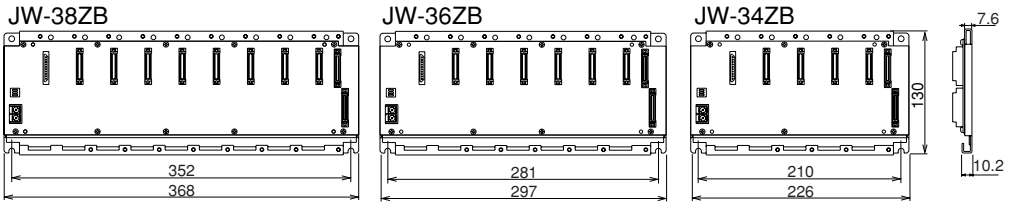


[5] Basic/expansion rack panel

(1) Basic rack panel

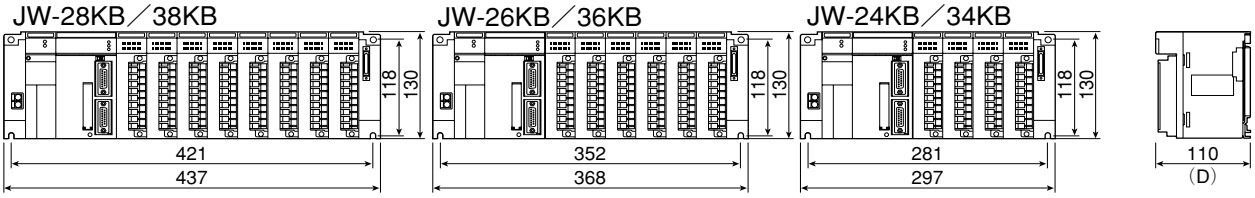


(2) Expansion rack panel

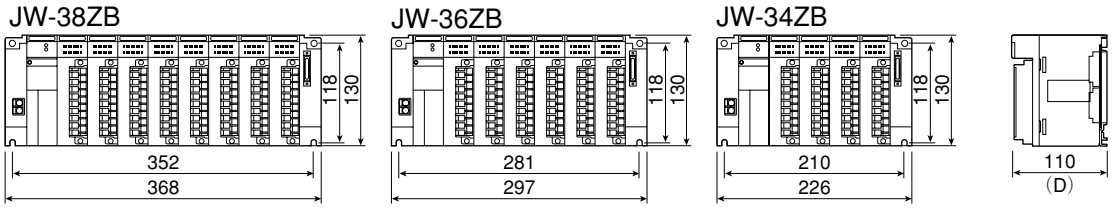


[6] Installation drawings on basic/expansion rack panel

- **Installation drawing on basic rack panel**

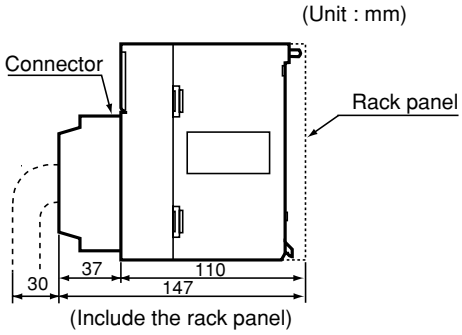


- **Installation drawing on expansion rack panel**

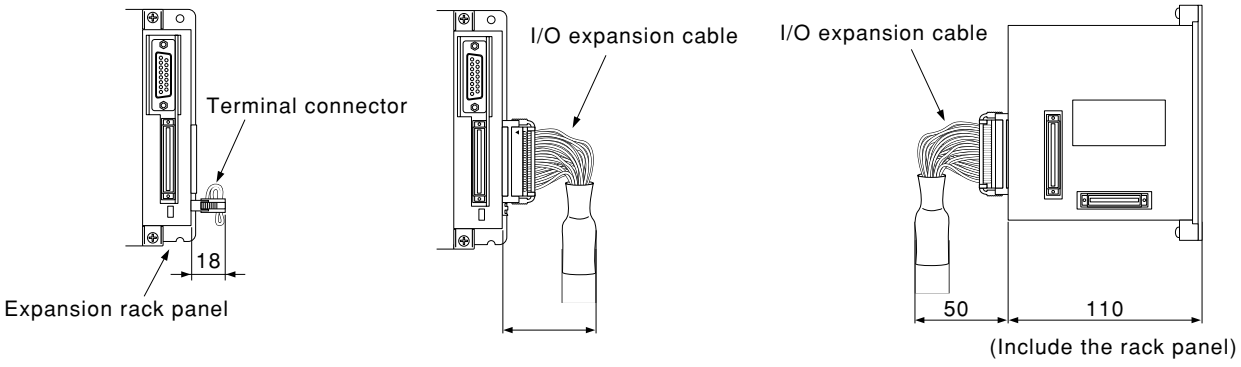


Note: When module cover JW-20CV (ordered separately) is installed on the I/O module etc., D (dimension) will increase 2.5 mm.

- **Dimension drawings in case of fitting connector in the 32/64 points module.**



- **Dimension drawings in case of fitting I/O expansion cable and termination connector in the I/O bus expansion adapter (JW-32EA).**



11-10 Accessories

	Model name	Accessories	Amount
Control module	JW-31CUH1 JW-32CUH1 JW-33CUH1 JW-32CUH2 JW-32CUH3	Instruction manual	1
Expansion rack panel	JW-34ZB JW-36ZB JW-38ZB	Side plate for I/O module	1
I/O expansion cable	JW-203EC	5 VDC cable (30 cm)	1
	JW-207EC	5 VDC cable (70 cm)	1
	JW-22EC	5 VDC cable (2 m) Short connector	1 1
	JW-25EC JW-210EC	Short connector	1
	JW-05EC	5 VDC cable (50 cm)	1
	JW-1EC	5 VDC cable (1 m)	2
I/O module	JW-234N JW-232S JW-232M	40P connector	1
	JW-264N JW-262S	40P connector	2
	JW-202S JW-203S	125 VAC 4A fuse element	1
I/O bus expansion adapter	JW-31EA	Termination connector	1

Appendix

■ Allocation of the relay No. for the 64 points I/O module.

[Rack 0]

	Pin No.	※ S/G	Setting value of module No. switch							
			0	1	2	3	4	5	6	7
Connector CN1(The first half 32 points)	3A	A-0	30000	30200	30400	30600	31000	31200	31400	31600
	3B	A-1	30001	30201	30401	30601	31001	31201	31401	31601
	4A	A-2	30002	30202	30402	30602	31002	31202	31402	31602
	4B	A-3	30003	30203	30403	30603	31003	31203	31403	31603
	5A	A-4	30004	30204	30404	30604	31004	31204	31404	31604
	5B	A-5	30005	30205	30405	30605	31005	31205	31405	31605
	6A	A-6	30006	30206	30406	30606	31006	31206	31406	31606
	6B	A-7	30007	30207	30407	30607	31007	31207	31407	31607
	7A	B-0	30010	30210	30410	30610	31010	31210	31410	31610
	7B	B-1	30011	30211	30411	30611	31011	31211	31411	31611
	8A	B-2	30012	30212	30412	30612	31012	31212	31412	31612
	8B	B-3	30013	30213	30413	30613	31013	31213	31413	31613
	9A	B-4	30014	30214	30414	30614	31014	31214	31414	31614
	9B	B-5	30015	30215	30415	30615	31015	31215	31415	31615
	10A	B-6	30016	30216	30416	30616	31016	31216	31416	31616
	10B	B-7	30017	30217	30417	30617	31017	31217	31417	31617
	11A	C-0	30020	30220	30420	30620	31020	31220	31420	31620
	11B	C-1	30021	30221	30421	30621	31021	31221	31421	31621
	12A	C-2	30022	30222	30422	30622	31022	31222	31422	31622
	12B	C-3	30023	30223	30423	30623	31023	31223	31423	31623
	13A	C-4	30024	30224	30424	30624	31024	31224	31424	31624
	13B	C-5	30025	30225	30425	30625	31025	31225	31425	31625
	14A	C-6	30026	30226	30426	30626	31026	31226	31426	31626
	14B	C-7	30027	30227	30427	30627	31027	31227	31427	31627
	15A	D-0	30030	30230	30430	30630	31030	31230	31430	31630
	15B	D-1	30031	30231	30431	30631	31031	31231	31431	31631
	16A	D-2	30032	30232	30432	30632	31032	31232	31432	31632
	16B	D-3	30033	30233	30433	30633	31033	31233	31433	31633
	17A	D-4	30034	30234	30434	30634	31034	31234	31434	31634
	17B	D-5	30035	30235	30435	30635	31035	31235	31435	31635
	18A	D-6	30036	30236	30436	30636	31036	31236	31436	31636
	18B	D-7	30037	30237	30437	30637	31037	31237	31437	31637
Connector CN2(The first half 32 points)	3A	A-0	30040	30240	30440	30640	31040	31240	31440	31640
	3B	A-1	30041	30241	30441	30641	31041	31241	31441	31641
	4A	A-2	30042	30242	30442	30642	31042	31242	31442	31642
	4B	A-3	30043	30243	30443	30643	31043	31243	31443	31643
	5A	A-4	30044	30244	30444	30644	31044	31244	31444	31644
	5B	A-5	30045	30245	30445	30645	31045	31245	31445	31645
	6A	A-6	30046	30246	30446	30646	31046	31246	31446	31646
	6B	A-7	30047	30247	30447	30647	31047	31247	31447	31647
	7A	B-0	30050	30250	30450	30650	31050	31250	31450	31650
	7B	B-1	30051	30251	30451	30651	31051	31251	31451	31651
	8A	B-2	30052	30252	30452	30652	31052	31252	31452	31652
	8B	B-3	30053	30253	30453	30653	31053	31253	31453	31653
	9A	B-4	30054	30254	30454	30654	31054	31254	31454	31654
	9B	B-5	30055	30255	30455	30655	31055	31255	31455	31655
	10A	B-6	30056	30256	30456	30656	31056	31256	31456	31656
	10B	B-7	30057	30257	30457	30657	31057	31257	31457	31657
	11A	C-0	30060	30260	30460	30660	31060	31260	31460	31660
	11B	C-1	30061	30261	30461	30661	31061	31261	31461	31661
	12A	C-2	30062	30262	30462	30662	31062	31262	31462	31662
	12B	C-3	30063	30263	30463	30663	31063	31263	31463	31663
	13A	C-4	30064	30264	30464	30664	31064	31264	31464	31664
	13B	C-5	30065	30265	30465	30665	31065	31265	31465	31665
	14A	C-6	30066	30266	30466	30666	31066	31266	31466	31666
	14B	C-7	30067	30267	30467	30667	31067	31267	31467	31667
	15A	D-0	30070	30270	30470	30670	31070	31270	31470	31670
	15B	D-1	30071	30271	30471	30671	31071	31271	31471	31671
	16A	D-2	30072	30272	30472	30672	31072	31272	31472	31672
	16B	D-3	30073	30273	30473	30673	31073	31273	31473	31673
	17A	D-4	30074	30274	30474	30674	31074	31274	31474	31674
	17B	D-5	30075	30275	30475	30675	31075	31275	31475	31675
	18A	D-6	30076	30276	30476	30676	31076	31276	31476	31676
	18B	D-7	30077	30277	30477	30677	31077	31277	31477	31677

[Rack 1]

	Pin No.	※ S/G	Setting value of module No. switch							
			0	1	2	3	4	5	6	7
Connector CN1(The first half 32 points)	3A	A-0	32000	32200	32400	32600	33000	33200	33400	33600
	3B	A-1	32001	32201	32401	32601	33001	33201	33401	33601
	4A	A-2	32002	32202	32402	32602	33002	33202	33402	33602
	4B	A-3	32003	32203	32403	32603	33003	33203	33403	33603
	5A	A-4	32004	32204	32404	32604	33004	33204	33404	33604
	5B	A-5	32005	32205	32405	32605	33005	33205	33405	33605
	6A	A-6	32006	32206	32406	32606	33006	33206	33406	33606
	6B	A-7	32007	32207	32407	32607	33007	33207	33407	33607
	7A	B-0	32010	32210	32410	32610	33010	33210	33410	33610
	7B	B-1	32011	32211	32411	32611	33011	33211	33411	33611
	8A	B-2	32012	32212	32412	32612	33012	33212	33412	33612
	8B	B-3	32013	32213	32413	32613	33013	33213	33413	33613
	9A	B-4	32014	32214	32414	32614	33014	33214	33414	33614
	9B	B-5	32015	32215	32415	32615	33015	33215	33415	33615
	10A	B-6	32016	32216	32416	32616	33016	33216	33416	33616
	10B	B-7	32017	32217	32417	32617	33017	33217	33417	33617
	11A	C-0	32020	32220	32420	32620	33020	33220	33420	33620
	11B	C-1	32021	32221	32421	32621	33021	33221	33421	33621
	12A	C-2	32022	32222	32422	32622	33022	33222	33422	33622
	12B	C-3	32023	32223	32423	32623	33023	33223	33423	33623
	13A	C-4	32024	32224	32424	32624	33024	33224	33424	33624
	13B	C-5	32025	32225	32425	32625	33025	33225	33425	33625
	14A	C-6	32026	32226	32426	32626	33026	33226	33426	33626
	14B	C-7	32027	32227	32427	32627	33027	33227	33427	33627
	15A	D-0	32030	32230	32430	32630	33030	33230	33430	33630
	15B	D-1	32031	32231	32431	32631	33031	33231	33431	33631
	16A	D-2	32032	32232	32432	32632	33032	33232	33432	33632
	16B	D-3	32033	32233	32433	32633	33033	33233	33433	33633
	17A	D-4	32034	32234	32434	32634	33034	33234	33434	33634
	17B	D-5	32035	32235	32435	32635	33035	33235	33435	33635
	18A	D-6	32036	32236	32436	32636	33036	33236	33436	33636
	18B	D-7	32037	32237	32437	32637	33037	33237	33437	33637
Connector CN2(The first half 32 points)	3A	A-0	32040	32240	32440	32640	33040	33240	33440	33640
	3B	A-1	32041	32241	32441	32641	33041	33241	33441	33641
	4A	A-2	32042	32242	32442	32642	33042	33242	33442	33642
	4B	A-3	32043	32243	32443	32643	33043	33243	33443	33643
	5A	A-4	32044	32244	32444	32644	33044	33244	33444	33644
	5B	A-5	32045	32245	32445	32645	33045	33245	33445	33645
	6A	A-6	32046	32246	32446	32646	33046	33246	33446	33646
	6B	A-7	32047	32247	32447	32647	33047	33247	33447	33647
	7A	B-0	32050	32250	32450	32650	33050	33250	33450	33650
	7B	B-1	32051	32251	32451	32651	33051	33251	33451	33651
	8A	B-2	32052	32252	32452	32652	33052	33252	33452	33652
	8B	B-3	32053	32253	32453	32653	33053	33253	33453	33653
	9A	B-4	32054	32254	32454	32654	33054	33254	33454	33654
	9B	B-5	32055	32255	32455	32655	33055	33255	33455	33655
	10A	B-6	32056	32256	32456	32656	33056	33256	33456	33656
	10B	B-7	32057	32257	32457	32657	33057	33257	33457	33657
	11A	C-0	32060	32260	32460	32660	33060	33260	33460	33660
	11B	C-1	32061	32261	32461	32661	33061	33261	33461	33661
	12A	C-2	32062	32262	32462	32662	33062	33262	33462	33662
	12B	C-3	32063	32263	32463	32663	33063	33263	33463	33663
	13A	C-4	32064	32264	32464	32664	33064	33264	33464	33664
	13B	C-5	32065	32265	32465	32665	33065	33265	33465	33665
	14A	C-6	32066	32266	32466	32666	33066	33266	33466	33666
	14B	C-7	32067	32267	32467	32667	33067	33267	33467	33667
	15A	D-0	32070	32270	32470	32670	33070	33270	33470	33670
	15B	D-1	32071	32271	32471	32671	33071	33271	33471	33671
	16A	D-2	32072	32272	32472	32672	33072	33272	33472	33672
	16B	D-3	32073	32273	32473	32673	33073	33273	33473	33673
	17A	D-4	32074	32274	32474	32674	33074	33274	33474	33674
	17B	D-5	32075	32275	32475	32675	33075	33275	33475	33675
	18A	D-6	32076	32276	32476	32676	33076	33276	33476	33676
	18B	D-7	32077	32277	32477	32677	33077	33277	33477	33677

※ Signal name

[Rack 2]

	Pin No.	※ S/G	Setting value of module No. switch 0	1	2	3	4	5	6	7
Connector CN1(The first half 32 points)	3A	A-0	34000	34200	34400	34600	35000	35200	35400	35600
	3B	A-1	34001	34201	34401	34601	35001	35201	35401	35601
	4A	A-2	34002	34202	34402	34602	35002	35202	35402	35602
	4B	A-3	34003	34203	34403	34603	35003	35203	35403	35603
	5A	A-4	34004	34204	34404	34604	35004	35204	35404	35604
	5B	A-5	34005	34205	34405	34605	35005	35205	35405	35605
	6A	A-6	34006	34206	34406	34606	35006	35206	35406	35606
	6B	A-7	34007	34207	34407	34607	35007	35207	35407	35607
	7A	B-0	34010	34210	34410	34610	35010	35210	35410	35610
	7B	B-1	34011	34211	34411	34611	35011	35211	35411	35611
	8A	B-2	34012	34212	34412	34612	35012	35212	35412	35612
	8B	B-3	34013	34213	34413	34613	35013	35213	35413	35613
	9A	B-4	34014	34214	34414	34614	35014	35214	35414	35614
	9B	B-5	34015	34215	34415	34615	35015	35215	35415	35615
	10A	B-6	34016	34216	34416	34616	35016	35216	35416	35616
	10B	B-7	34017	34217	34417	34617	35017	35217	35417	35617
	11A	C-0	34020	34220	34420	34620	35020	35220	35420	35620
	11B	C-1	34021	34221	34421	34621	35021	35221	35421	35621
	12A	C-2	34022	34222	34422	34622	35022	35222	35422	35622
	12B	C-3	34023	34223	34423	34623	35023	35223	35423	35623
	13A	C-4	34024	34224	34424	34624	35024	35224	35424	35624
	13B	C-5	34025	34225	34425	34625	35025	35225	35425	35625
	14A	C-6	34026	34226	34426	34626	35026	35226	35426	35626
	14B	C-7	34027	34227	34427	34627	35027	35227	35427	35627
	15A	D-0	34030	34230	34430	34630	35030	35230	35430	35630
	15B	D-1	34031	34231	34431	34631	35031	35231	35431	35631
	16A	D-2	34032	34232	34432	34632	35032	35232	35432	35632
	16B	D-3	34033	34233	34433	34633	35033	35233	35433	35633
	17A	D-4	34034	34234	34434	34634	35034	35234	35434	35634
	17B	D-5	34035	34235	34435	34635	35035	35235	35435	35635
	18A	D-6	34036	34236	34436	34636	35036	35236	35436	35636
	18B	D-7	34037	34237	34437	34637	35037	35237	35437	35637
Connector CN2(The first half 32 points)	3A	A-0	34040	34240	34440	34640	35040	35240	35440	35640
	3B	A-1	34041	34241	34441	34641	35041	35241	35441	35641
	4A	A-2	34042	34242	34442	34642	35042	35242	35442	35642
	4B	A-3	34043	34243	34443	34643	35043	35243	35443	35643
	5A	A-4	34044	34244	34444	34644	35044	35244	35444	35644
	5B	A-5	34045	34245	34445	34645	35045	35245	35445	35645
	6A	A-6	34046	34246	34446	34646	35046	35246	35446	35646
	6B	A-7	34047	34247	34447	34647	35047	35247	35447	35647
	7A	B-0	34050	34250	34450	34650	35050	35250	35450	35650
	7B	B-1	34051	34251	34451	34651	35051	35251	35451	35651
	8A	B-2	34052	34252	34452	34652	35052	35252	35452	35652
	8B	B-3	34053	34253	34453	34653	35053	35253	35453	35653
	9A	B-4	34054	34254	34454	34654	35054	35254	35454	35654
	9B	B-5	34055	34255	34455	34655	35055	35255	35455	35655
	10A	B-6	34056	34256	34456	34656	35056	35256	35456	35656
	10B	B-7	34057	34257	34457	34657	35057	35257	35457	35657
	11A	C-0	34060	34260	34460	34660	35060	35260	35460	35660
	11B	C-1	34061	34261	34461	34661	35061	35261	35461	35661
	12A	C-2	34062	34262	34462	34662	35062	35262	35462	35662
	12B	C-3	34063	34263	34463	34663	35063	35263	35463	35663
	13A	C-4	34064	34264	34464	34664	35064	35264	35464	35664
	13B	C-5	34065	34265	34465	34665	35065	35265	35465	35665
	14A	C-6	34066	34266	34466	34666	35066	35266	35466	35666
	14B	C-7	34067	34267	34467	34667	35067	35267	35467	35667
	15A	D-0	34070	34270	34470	34670	35070	35270	35470	35670
	15B	D-1	34071	34271	34471	34671	35071	35271	35471	35671
	16A	D-2	34072	34272	34472	34672	35072	35272	35472	35672
	16B	D-3	34073	34273	34473	34673	35073	35273	35473	35673
	17A	D-4	34074	34274	34474	34674	35074	35274	35474	35674
	17B	D-5	34075	34275	34475	34675	35075	35275	35475	35675
	18A	D-6	34076	34276	34476	34676	35076	35276	35476	35676
	18B	D-7	34077	34277	34477	34677	35077	35277	35477	35677

[Rack 3]

	Pin No.	※ S/G	Setting value of module No. switch 0	1	2	3	4	5	6	7
Connector CN1(The first half 32 points)	3A	A-0	36000	36200	36400	36600	37000	37200	37400	37600
	3B	A-1	36001	36201	36401	36601	37001	37201	37401	37601
	4A	A-2	36002	36202	36402	36602	37002	37202	37402	37602
	4B	A-3	36003	36203	36403	36603	37003	37203	37403	37603
	5A	A-4	36004	36204	36404	36604	37004	37204	37404	37604
	5B	A-5	36005	36205	36405	36605	37005	37205	37405	37605
	6A	A-6	36006	36206	36406	36606	37006	37206	37406	37606
	6B	A-7	36007	36207	36407	36607	37007	37207	37407	37607
	7A	B-0	36010	36210	36410	36610	37010	37210	37410	37610
	7B	B-1	36011	36211	36411	36611	37011	37211	37411	37611
	8A	B-2	36012	36212	36412	36612	37012	37212	37412	37612
	8B	B-3	36013	36213	36413	36613	37013	37213	37413	37613
	9A	B-4	36014	36214	36414	36614	37014	37214	37414	37614
	9B	B-5	36015	36215	36415	36615	37015	37215	37415	37615
	10A	B-6	36016	36216	36416	36616	37016	37216	37416	37616
	10B	B-7	36017	36217	36417	36617	37017	37217	37417	37617
	11A	C-0	36020	36220	36420	36620	37020	37220	37420	37620
	11B	C-1	36021	36221	36421	36621	37021	37221	37421	37621
	12A	C-2	36022	36222	36422	36622	37022	37222	37422	37622
	12B	C-3	36023	36223	36423	36623	37023	37223	37423	37623
	13A	C-4	36024	36224	36424	36624	37024	37224	37424	37624
	13B	C-5	36025	36225	36425	36625	37025	37225	37425	37625
	14A	C-6	30026	36226	36426	36626	37026	37226	37426	37626
	14B	C-7	36027	36227	36427	36627	37027	37227	37427	37627
	15A	D-0	36030	36230	36430	36630	37030	37230	37430	37630
	15B	D-1	36031	36231	36431	36631	37031	37231	37431	37631
	16A	D-2	36032	36232	36432	36632	37032	37232	37432	37632
	16B	D-3	36033	36233	36433	36633	37033	37233	37433	37633
	17A	D-4	36034	36234	36434	36634	37034	37234	37434	37634
	17B	D-5	36035	36235	36435	36635	37035	37235	37435	37635
	18A	D-6	36036	36236	36436	36636	37036	37236	37436	37636
	18B	D-7	36037	36237	36437	36637	37037	37237	37437	37637
Connector CN2(The first half 32 points)	3A	A-0	36040	36240	36440	36640	37040	37240	37440	37640
	3B	A-1	36041	36241	36441	36641	37041	37241	37441	37641
	4A	A-2	36042	36242	36442	36642	37042	37242	37442	37642
	4B	A-3	36043	36243	36443	36643	37043	37243	37443	37643
	5A	A-4	36044	36244	36444	36644	37044	37244	37444	37644
	5B	A-5	36045	36245	36445	36645	37045	37245	37445	37645
	6A	A-6	36046	36246	36446	36646	37046	37246	37446	37646
	6B	A-7	36047	36247	36447	36647	37047	37247	37447	37647
	7A	B-0	36050	36250	36450	36650	37050	37250	37450	37650
	7B	B-1	36051	36251	36451	36651	37051	37251	37451	37651
	8A	B-2	36052	36252	36452	36652	37052	37252	37452	37652
	8B	B-3	36053	36253	36453	36653	37053	37253	37453	37653
	9A	B-4	36054	36254	36454	36654	37054	37254	37454	37654
	9B	B-5	36055	36255	36455	36655	37055	37255	37455	37655
	10A	B-6	36056	36256	36456	36656	37056	37256	37456	37656
	10B	B-7	36057	36257	36457	36657	37057	37257	37457	37657
	11A	C-0	36060	36260	36460	36660	37060	37260	37460	37660
	11B	C-1	36061	36261	36461	36661	37061	37261	37461	37661
	12A	C-2	36062	36262	36462	36662	37062	37262	37462	37662
	12B	C-3	36063	36263	36463	36663	37063	37263	37463	37663
	13A	C-4	36064	36264	36464	36664	37064	37264	37464	37664
	13B	C-5	36065	36265	36465	36665	37065	37265	37465	37665
	14A	C-6	36066	36266	36466	36666	37066	37266	37466	37666
	14B	C-7	36067	36267	36467	36667	37067	37267	37467	37667
	15A	D-0	36070	36270	36470	36670	37070	37270	37470	37670
	15B	D-1	36071	36271	36471	36671	37071	37271	37471	37671
	16A	D-2	36072	36272	36472	36672	37072	37272	37472	37672
	16B	D-3	36073	36273	36473	36673	37073	37273	37473	37673
	17A	D-4	36074	36274	36474	36674	37074	37274	37474	37674
	17B	D-5	36075	36275	36475	36675	37075	37275	37475	37675
	18A	D-6	36076	36276	36476	36676	37076	37276	37476	37676
	18B	D-7	36077	36277	36477	36677	37077	37277	37477	37677

※ Signal name

［Remote I/O］

	Pin No.	※ S/G	Setting value of module No. switch							
			0	1	2	3	4	5	6	7
Connector CN1(The first half 32 points)	3A	A-0	40000	40200	40400	40600	41000	41200	41400	41600
	3B	A-1	40001	40201	40401	40601	41001	41201	41401	41601
	4A	A-2	40002	40202	40402	40602	41002	41202	41402	41602
	4B	A-3	40003	40203	40403	40603	41003	41203	41403	41603
	5A	A-4	40004	40204	40404	40604	41004	41204	41404	41604
	5B	A-5	40005	40205	40405	40605	41005	41205	41405	41605
	6A	A-6	40006	40206	40406	40606	41006	41206	41406	41606
	6B	A-7	40007	40207	40407	40607	41007	41207	41407	41607
	7A	B-0	40010	40210	40410	40610	41010	41210	41410	41610
	7B	B-1	40011	40211	40411	40611	41011	41211	41411	41611
	8A	B-2	40012	40212	40412	40612	41012	41212	41412	41612
	8B	B-3	40013	40213	40413	40613	41013	41213	41413	41613
	9A	B-4	40014	40214	40414	40614	41014	41214	41414	41614
	9B	B-5	40015	40215	40415	40615	41015	41215	41415	41615
	10A	B-6	40016	40216	40416	40616	41016	41216	41416	41616
	10B	B-7	40017	40217	40417	40617	41017	41217	41417	41617
	11A	C-0	40020	40220	40420	40620	41020	41220	41420	41620
	11B	C-1	40021	40221	40421	40621	41021	41221	41421	41621
	12A	C-2	40022	40222	40422	40622	41022	41222	41422	41622
	12B	C-3	40023	40223	40423	40623	41023	41223	41423	41623
	13A	C-4	40024	40224	40424	40624	41024	41224	41424	41624
	13B	C-5	40025	40225	40425	40625	41025	41225	41425	41625
	14A	C-6	40026	40226	40426	40626	41026	41226	41426	41626
	14B	C-7	40027	40227	40427	40627	41027	41227	41427	41627
	15A	D-0	40030	40230	40430	40630	41030	41230	41430	41630
	15B	D-1	40031	40231	40431	40631	41031	41231	41431	41631
	16A	D-2	40032	40232	40432	40632	41032	41232	41432	41632
	16B	D-3	40033	40233	40433	40633	41033	41233	41433	41633
	17A	D-4	40034	40234	40434	40634	41034	41234	41434	41634
	17B	D-5	40035	40235	40435	40635	41035	41235	41435	41635
	18A	D-6	40036	40236	40436	40636	41036	41236	41436	41636
	18B	D-7	40037	40237	40437	40637	41037	41237	41437	41637
Connector CN2(The first half 32 points)	3A	A-0	40040	40240	40440	40640	41040	41240	41440	31640
	3B	A-1	40041	40241	40441	40641	41041	41241	41441	31641
	4A	A-2	40042	40242	40442	40642	41042	41242	41442	31642
	4B	A-3	40043	40243	40443	40643	41043	41243	41443	31643
	5A	A-4	40044	40244	40444	40644	41044	41244	41444	31644
	5B	A-5	40045	40245	40445	40645	41045	41245	41445	31645
	6A	A-6	40046	40246	40446	40646	41046	41246	41446	31646
	6B	A-7	40047	40247	40447	40647	41047	41247	41447	41647
	7A	B-0	40050	40250	40450	40650	41050	41250	41450	41650
	7B	B-1	40051	40251	40451	40651	41051	41251	41451	41651
	8A	B-2	40052	40252	40452	40652	41052	41252	41452	41652
	8B	B-3	40053	40253	40453	40653	41053	41253	41453	41653
	9A	B-4	40054	40254	40454	40654	41054	41254	41454	41654
	9B	B-5	40055	40255	40455	40655	41055	41255	41455	41655
	10A	B-6	40056	40256	40456	40656	41056	41256	41456	41656
	10B	B-7	40057	40257	40457	40657	41057	41257	41457	41657
	11A	C-0	40060	40260	40460	40660	41060	41260	41460	41660
	11B	C-1	40061	40261	40461	40661	41061	41261	41461	41661
	12A	C-2	40062	40262	40462	40662	41062	41262	41462	41662
	12B	C-3	40063	40263	40463	40663	41063	41263	41463	41663
	13A	C-4	40064	40264	40464	40664	41064	41264	41464	41664
	13B	C-5	40065	40265	40465	40665	41065	41265	41465	41665
	14A	C-6	40066	40266	40466	40666	41066	41266	41466	41666
	14B	C-7	40067	40267	40467	40667	41067	41267	41467	41667
	15A	D-0	40070	40270	40470	40670	41070	41270	41470	41670
	15B	D-1	40071	40271	40471	40671	41071	41271	41471	41671
	16A	D-2	40072	40272	40472	40672	41072	41272	41472	41672
	16B	D-3	40073	40273	40473	40673	41073	41273	41473	41673
	17A	D-4	40074	40274	40474	40674	41074	41274	41474	41674
	17B	D-5	40075	40275	40475	40675	41075	41275	41475	41675
	18A	D-6	40076	40276	40476	40676	41076	41276	41476	41676
	18B	D-7	40077	40277	40477	40677	41077	41277	41477	41677

※ Signal name